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Anthropologia Nova ;
OR, A
NEW SYSTEM
OF
ANATOMY.
Describing the
ANIMAL OECONOMY,
AND A
Short RATIONALE
Of many
DISTEMPERS
INCIDENT TO
Human Bodies.

In which are inserted divers *Anatomical Discoveries*, and *Medicinal Observations*, with the History of the Parts.

Illustrated with above Fourscore Figures, drawn after the *Life* : And to every Chapter a SYLLABUS of the Parts describ'd, for the Instruction of Young *Anatomists*.

By JAMES DRAKE, M. D.
Fellow of the College of Physicians, and of the Royal Society.

VOL. I.

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Librum hanc, cui Titulus, An-
thropologia Nova; or, A
New System of Anatomy, &c.
dignum censemus qui Typis mandetur.

Datum ex Aedibus nostris
Comitiis Censoriis, Apr. 4.
1797.

Edvardus Browne, Præses.

Gualt. Charleton }
Carolus Goodall } Censores.
Johan. Bateman }
Tho. Gill }

to Cg

TO HIS GRACE,

HENRY

Duke of Beaufort.

May it Please your Grace,

IF the Author of this Book
had liv'd to Enjoy the Ho-
nour Your GRACE allow'd
him, of Inscribing of it to so
Great a Name, He would have
done that Justice to Your
A 2 GRACE'S

DEDICATION.

GRACE'S Character, which
cannot be expected from a Re-
tir'd Disconsolate Woman;
whose great Misfortune it is,
that it was not offer'd to Your
GRACE by a better Hand. But
all that he could have said of
Your GRACE'S Princely Fa-
mily, Steady Principles, and
Unbounded Generosity, is no
more than the World already
knows and acknowledges. The
Aim of his Ambition, in Ad-
dressing to Your GRACE, was,
to Recommend this Work to that
Fa-

DEDICATION.

Favour Your GRACE had shown to some of his Performances in another way: And this, to my unspeakable Grief, I can do more effectually than he could have done himself. For 'tis now an Orphan that I am pleading for to Your GRACE; and as nothing Engages a truly Noble Mind, like an Object of Compassion, so the Distressed have always the surest Title to Your GRACE's Protection: And this I hope will excuse me (no otherwise known to Your GRACE

DEDICATION.

*than by my Calamities) for
presuming to lay this Offering at
Your GRACE's Feet, and Sub-
scribing my self,*

May it Please Your GRACE,

Your GRACE's

Most Obedient and

Most Humble Servant,

Judith Drake.

PREFACE.

IT has been customary for Authors (even of the Highest Reputation, and the most conscious of their own Worth and Abilities) to offer something to their Readers, in Justification, or by way of Apology at least, for their Undertakings; to take off the Imputation of presuming to be Wiser than the rest of the World; to, and for whom they wrote. What was decent Modesty in such Men, is perhaps Necessity in me; the Meanness of whose Performance may seem to call loudly for an Apology. But, if an Excuse may at any time be receiv'd for the Imperfection of Works thus offer'd to the Publick, that Favour may justly be indulg'd to me, upon the score of the extraordinary Interruptions I met with in the Prosecution of this Work; the Nature and Story of many of which, are but too well known to need to be reviv'd here, and the rest not worth troubling the Publick with.

It is generally objected, That Authors are *Volunteers*; and therefore should be very sure of acquitting themselves Honourably, or not enter the Service; which must

render them inexcusable upon any other Terms. But if *Philanthropy*, and a desire of contributing something to the Common Benefit of Mankind, be not an Excuse for moderate Failings in Laudable Designs (*in quibus voluisse sat est*) there's an end of the *Commonwealth of Letters*; and none but Coxcombs will put Pen to Paper for the Prefs. Sense and Modesty generally go together: But no Man that has either, will presume so far upon his own Sufficiency, or make such an Ostentatious Declaration of his Vanity and Self-Conceit, as becoming an Author, upon those hard Terms, would amount to.

Tho' I have a very great Affection for Mankind in general, and more particularly for my own Country, and as much Ambition to shew it, because I think it a Laudable Ambition; yet I shall not defend the Imperfections of this Work that way, lest I should be taken to think my self a more Necessary Person, and my own Performance more Valuable, than I really do.

But as I think the True Reason always the Best, especially when 'tis an Honest one, I shall make no Scruple to tell it plainly. I had a little before those Vexatious Interruptions, which I have since met with, came upon me, engag'd to the *Booksellers* who Print this, to draw up a short System upon the Figures of *Blancard*, which they,

P R E F A C E.

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they, without my Advice had purchas'd, in expectation of having that done by the late Ingenious Dr. *Havers*, (according to a Contract they had made with him) which now is fall'n to my Share; which Figures were procur'd at his Instance, and make the *Appendix* to this Work.

The Execution of this Design was retard- ed by some Troublesome Affairs of my own, much longer than I could have sus- pected: And therefore to make them some amends for the Delay; tho' I could not sit down earnestly to the Work, I did, at such Intervals as I had, consider how to improve the Design; in which, I hope, I have not been altogether Unsuccessful. However, I was diverted by such Avocations, that had it not been for the Assistance of my Learned and Ingenious Friends, Dr. *Branchwait* and Mr. *Cowper*, I know not whether I should have had Courage or Patience to have gone thro' with it.

The great Skill and Experience of Mr. *Cowper* in *Anatomical* Affairs, had made it an Injury to my self and this Work, not to have made the best Use of the Benefit of his Friendship. For besides the several Plates with which the Body of this Work is ad- dorned (which are all, except Four, owing to him) it is likewise embellish'd with divers Curious Speculations, and Use- ful Observations; besides some whole Chap-

Chapters, either written by him, for this very purpose, or extracted from some of his former Writings; such as the Chapters of the *Penis*, and of the *Nose*: To all which I have generally taken care to entitle him by Name.

To this Gentleman's great Conversation in Human Subjects, it is that I owe the rectifying many Errors, not to be adjusted by *Anatomical Books*; amongst which are innumerable Differences not to be decided but by *Autopsy*; which, in the Scarcity of Human Subjects amongst us, would have requir'd Years for Decision, had it not been for the Numerous Collection of PREPARATIONS and DRAWINGS, which Mr. *Camper* keeps by him; the latter being all done by himself from the Life.

The other Gentleman whom I have mention'd, is so well recommended to all that know him by his Learning and Ingenuity; that he needs no Character from me; and therefore I mention him only by way of Acknowledgment for that Kind Assistance that he afforded me, without which, this Work must have gone but slowly forward, as I was then embarras'd. This Gentleman was so kind as to assist me, not only in Collating the many *Anatomical Authors* which I was, on this Occasion, bound to consult, and to furnish me with many Judicious Reflections thereupon, but to re-

lieve

lieve me with his own Hand, from the fatigue of Writing; at which I own my self not to be very ready; nor under it very easie; and therefore I think my self happy in a Friend, who could not only assist me with his Judgment, but his Hand likewise, in which most of this Work was written.

Thus far went the Learned and Ingenious Author: And whatever he would have thought fit to add, if the Almighty had prolong'd his Life, we may certainly conclude would have been very Instructive, and proper to illustrate this Work, which now comes forth without that Advantage.

What was known of his Intentions, is only that he design'd a pretty large Discourse on the Usefulness of the Study of *Anatomy*, to the Practice both of *Physick* and *Surgery*; and of what Necessity the Knowledge of it is, to accomplish a Man either in the one, or the other, which indeed, one would think a Truth too evident to be deny'd: And that at this time, there should be any sort of Men, who endeavour to represent *Anatomical Enquiries*, as Trifling Curiosities only to amuse Mankind, is really wonderful; but the little Credit they obtain from Men of Sense, is a just Excuse from making any other Reflection upon them, than barely mentioning them.

If

If the Art of *Curing Diseases* has not met with proportionable Advances since *Galen*, the true Reason was the want of Skill in *Anatomy*. This is a Truth which succeeding Ages must confirm, if those who have proper Heads and Hands would contribute their Endeavours.

It is certain, as much improv'd as *Anatomy* has been these latter Years, there still remains a vast Field to Cultivate Useful Discoveries in; even such as will serve, not only to explain some *Phænomena* of Diseases, but to point out to us their Seats and Methods of Cure. An uncontestable Proof of this may be seen in *Book III. Chap. 16.* of this *System of Anatomy*, in the Cure of an *Ozena*; as well as in many Useful Discoveries and Observations in Practice, dispersed up and down in this Work.

The Method of Treating the *Parrus* us'd by the Learned Author is such, as appear'd to him to be the most Natural; and will doubtless be found so. However, to prevent the Difficulty that may attend those who have been only Conversant in the Common Methods of other Books of this kind; Care is here taken, to fix the Title of the Contents to the Top of each Page, that it may be readily turn'd to.

Under the Title of each Chapter he has plac'd a Concise *Syllabus*, of the Latin Proper Names of the Parts; which, at one View,

View, gives an exact Scheme of the Particulars that are the Subject of the ensuing Chapter, and the Method in which they are treated of.

The Figures in the *Appendix* (annex'd to the first Volume) were of the first Edition of Dr. Stephen Blancard's *Anatomia Reformata*, and are Borrow'd from other Books of *Anatomy*; from which, and *Autopsy*, the Explications here annex'd are written, and not from that Collector's Account of them, which is full of Gross Mistakes, tho' he did no more than Transcribe the Explications of their Original Authors.

How Clearly and Truly our Author has reason'd upon the Natural Functions, must be left to every Reader's Judgment: But if in solving a great many *Phænomena*, he has made use of a different *Hypothesis* from other Learned Men, it was, because, upon the best Grounds of Observation and Reflection, he thought it to be true, and that he was able to defend it.

It were to be wish'd, That as he has gratefully done Justice to his two Friends, who facilitated his Performance of this Work; some one of the Multitude of his Learned Acquaintance would do Justice to his Memory, in giving the World a true Character of him.

How thoroughly he understood the Fabric and Constitution of *Humane Bodies*, this

*A Treatise
de Morbis
Conge-
neribus,
&c.*

this *System of Anatomy* is a Convincing Testimony: And his Notions about the Diseases incident to them, were not less Clear and Comprehensive. This would have been abundantly made out, and probably the Case of Physick have been more truly Stated, if he had liv'd to finish several *Treatises* he design'd for the *Press*; of which he left behind him many Materials, and intended, when he had Leisure and Calmness of Thought, to put together.

But as he had Read much, and Study'd hard; so he knew how to make them applicable and subservient to his Profession. A bare *Hypothesis*, he knew would go but a little way towards the Cure of Diseases; and therefore he never depended upon any, how specious soever, that were not grounded upon Observations and Experience; which was the true way he took to be a Successful as well as a Learned Physician.

He was so very well acquainted with the *Materia Medica*, and had so well weigh'd the Qualities and Virtues of particular Simples, that he generally approv'd, and made use of the shortest Prescriptions as the best: And this he did for many good Reasons, as well as out of Conscience to his Patients; and a desire of taking the shortest and easiest way of doing Good to Mankind. 'Tis true, this was not very obliging to a certain Community of Men, who seldom fail, when

when they have Power, to shew their Re-
sentments.

Nor was our Author only Learned in his
own Profession, but he truly deserv'd the
Character of an *Universal Scholar*. He was
thoroughly acquainted with the *Classical
Authors*, both *Greek* and *Latin*, whether
Historians, *Orators* or *Poets*, whom he
knew how to imitate in all their Strength
and Beauty. He had made a considerable
Progress in all the *Liberal Sciences*, and
could instructively entertain such as were
the Professors of any one of them. His
Style, both *Latin* and *English*, was Manly
yet Easy; Concise, yet Clear and Expres-
sive: And even those who sometimes dis-
approv'd the Subject of his Writings, could
not but applaud the Politeness of his Com-
posures; for he had arriv'd to that difficult
Perfection, of knowing how to make use
of his Learning without Pedantry or Osten-
tation.

Neither was his Knowledge confin'd on-
ly to *Books*, for he had Read and Study'd
Men with the same Care and Exactness.
He was very well acquainted with the State
and Circumstances of the World; and by
his great Knowledge in Ancient and Mo-
dern Histories, and his own Observations,
had made himself a Judge of Political, as
well as Natural Constitutions.

His

His Friendship was not sufficiently to be valu'd, because it was dis-interested and sincere; and whoever he made a Profession of it to, had a Right to all the Good Offices that were in his Power: And indeed he was act-ed by such an extensive Benignity and Good-nature, that he took Pleasure in serving all Men without Distinction of Parties, or hopes of Retribution.

He was Steady to his Principles, because they were the Result of his Judgment, after a strict and mature Examination; and this made him uncapable of those little Changes, which Times and Occasions subject most Men to, for want of such a firmness and presence of Mind, as not only the Study of *Humane Nature*, but of the *Moral Science*, had endow'd him with.

Some perhaps may think, that this Author's *Pencil* was a little too bold in the *Design* and *Colouring*: but viewing the present Age in a true *Perspective*, it might be difficult for an honest Man not to write *Satyr*. It was thought no Crime even in the Age of *Augustus*, to speak and write freely: Indeed some of the succeeding *Emperors* made it so, though not all; And the present *Reign* of a most *Glorious, Conquering, Vertuous QUEEN*, may be indulgent in such Liberties, as cannot move the mighty Fabrick.

To

To conclude, He was too good a Philosopher to look no further than *Natural Causes*; and his Skill in *Physiology* was so far from leading him into *Scepticism* and Infidelity, that it gave him an Awful Sense of Religion. How hearty a Lover he was of the *Established Church*, of which he was a *Member*, will be acknowledg'd by all those that knew how ready and indefatigable he was, at all times, to vindicate and serve it.

E R R A T A.

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A NEW SYSTEM OF ANATOMY.

BOOK I.

CHAP. I.

Of the General Constituent Parts of the Body.

SYLLABUS.

Partium Corporis Humani Generalium.

<i>Partes Generales sunt vel Solida & Continentes</i>	<i>Offa</i>	<i>Vel Fluida & Contenta</i>	<i>Chylus</i>
	<i>Cartilaginee</i>		<i>Lac</i>
	<i>Ligamenta</i>		<i>Serum</i>
	<i>Membrana</i>		<i>Sanguis</i>
	<i>Fibra</i>		<i>Adeps</i>
	<i>Musculi</i>		<i>Spiritus</i>
	<i>Tendines</i>		<i>Lympha</i> { <i>Narium</i>
	<i>Arteria</i>		<i>Mucus</i> { <i>Articu-</i>
	<i>Vena</i>		<i>Saliva</i> { <i>lorum</i>
	<i>Nervi</i>		<i>Bilis</i> { <i>Urethra</i>
	<i>Glandulae</i>		<i>Succus Pancreatis</i>
	<i>Lymphaductus</i>		<i>Semen</i>
	<i>Vena Lactea</i>		<i>Medulla Ossium</i>
	<i>Ductus Excretorii</i>		<i>Cerumen Aurium</i>

ANATOMY is the Art of Dissecting, *Anatomy*
or artificially taking to pieces the *whate*
solid Parts of *Animal Bodies*, in or-
der to an exact discovery of their Structure.

Speculative and Practical.

It is often divided into *Speculative* and *Practical*, a Division which I think not very momentous, and therefore shall not insist upon.

Its Subject.

The Subject of it is a *Humane Body*: And tho' *Brutes* and *other Animals*, and sometimes *Vegetables*, fall under its Consideration, it is only (with *Physicians* at least) in order to illustrate the former; and is called *Comparative Anatomy*.

Comparative Anatomy.

Vulgar Divisions of the Body.

Anatomists have usually divided the *Body* into Parts *Organical* and *Inorganical*, *Similar* and *Dissimilar*, *Spermatick*, &c. but to what use, or with how much Instruction, is not very apparent to me, who am apt to think such Distinctions only burthensom to the Memory, and not very edifying.

Useless.

Necessary Division.

However, there is a Division, which is not to be neglected, which is into such Parts, as will have frequent occasion to be mention'd in the following Discourses, that are capable of a General Definition, which would not be proper so often as the mention of them will particularly recur. It will however be absolutely necessary for the benefit of Learners (for whose sake such Treatises as this are written) that a General Idea be given of them, before they come to read of them separately.

Enumeration of the Solid Parts

The whole Body consists of *Bones*, *Cartilages*, *Ligaments*, *Membranes*, *Fibres*, *Muscles*, *Tendons*, *Arteries*, *Veins*, *Nerves*, *Glands*, *Lym-*

Lymphaducts, Lacteals, and some other peculiar Ducts, which will be best known by their Descriptions in their proper places.

Besides these which are the *Solid and Con-* *Fluids or Humours,*
tinent Parts, there are contain'd in them
 divers *Fluids,* such as the *Chyle, Blood, Milk,*
Fat, Serum, Lymph, Spirits, Bile, Salival,
Pancreatick Juice, Seed, &c.

A *BONE* is the hardest part of the Bo- *Bone de-*
 dy, and the Prop and Support of all the rest, *fin'd.*
 for which end it is fram'd. Its Substance
 is white, fragil, not distendible, (but in
 morbid cases) and void of Sensation. The
 Bones are all cover'd with a peculiar Mem-
 brane call'd the *Periosteum,* which is ex- *Perioste-*
 tremely sensible, and many of them are *um.*
 hollow, and fill'd with an oily fat Substance,
 which is called the *Marrow.* *Marrow.*

At their ends they are usually capp'd with *Cartilage.*
 a white, smooth Substance, somewhat softer
 than themselves, upon which they move and
 turn, and which is called a *CARTILAGE;*
 which in length of time often grows boney,
 as it is generally found in old People.

To the Bones are always annex'd *LIGA-* *Ligaments,*
MENTS, which are a tough, flexile, smooth
 Substance, serving to tie them together, and
 sometimes resembling a *Tendinous* or *Ner-*
vous, sometimes a *Membranous,* and some-
 times *Cartilaginous* Substance, into which, in
 some Diseases, they often degenerate.

Membrane A MEMBRANE is a *thin, white, or transparent, flexible, expanded Substance. serving to cover and cloath the other Parts, which is the proper and peculiar use of it*: When it is the covering of a *Vessel*, it is called a *Coat* or *Tunic*: Those that cover the *Brain*, are by a peculiar Name call'd *Meninges* or *Matres*; of which more in their proper place.

Fibre. A FIBRE (call'd likewise a *Filament*) is a *long slender Thread, and, like a Thread, is in the several Parts variously wound up into a great diversity of Figures*. These *Fibres* (according to the now prevailing Opinion) are all hollow, and percolated by some Fluid or other, which renders them in effect all *Vessels*. There are four sorts of them according to the vulgar Division, *Carnous, Nervous, Tendinous, and Osseous*, of one or other of which, all the other Parts consist.

Muscle. A MUSCLE is a *fleshy Part consisting of Fibres, and serving for Motion*. It is ordinarily divided into three parts, which are call'd the *Head, the Belly and the Tail*, of which the *Head* and the *Tail* are generally the *Tendons*, the *Head* being that *Extremity* which is fixt to the Part most stable; the *Tail* to the more moveable. *Muscles* are likewise divided into *Simple and Compound*; the *Simple* are those which have but one *Venter* or *Belly*; the *Compound* those which have two or more; or otherwise, the *Simple* are those

those which consist of a Simple order of *Fibres*, and the Compound of *Fibres* variously disposed.

The *Belly* of a *Muscle* is the *thick, fleshy* ^{Venter, or Belly.} part, into which are inserted the *Arteries* and *Nerves*, and out of which issue the *Veins* and *Lymphæducts*.

A *TENDON* is the hard white part of *Tendon*. a *Muscle*, usually placed at either *Extremity* of the *Muscle*, and co-operating with it in its *Action*. The *Fibres* of this are ordinarily thought to be *Nervous*, but (in my Opinion) are only Productions of the same *Fibres*, which make the *Belly* of the *Muscle*, but their being more closely and firmly connected, makes the difference of appearance, and their whiteness proceeds only from the *Blood's* being partly excluded by the tightness of their *Contexture*; so that there seems to be no other difference between them, than there is between a *Skein* of *Thread*, and a *Cord* made of the same *Thread*. In the *Limbs* one of these *Tendons* is usually fixt to an unmovable Point, the other to a movable: So that when the *Belly* of the *Muscle* in *Contraction* is swell'd and shortned, the movable Point is drawn towards the immovable, by which means *Local Motion* is perform'd.

AN *ARTERY* is a hollow *Fistulous Channel*, conveying *Blood* from the *Heart* to all *Parts*. ^{Artery.} It ordinarily consists of three *Coats*, or *Membranes*:

Its Coats. *branes*: The outward, *Nervous* or *Tendinous*: The second, *Carnous* or *Muscular*: The third, *Glandulous* or *Vascular*: Thro' these is all the Blood of the Body convey'd towards the Surface. All *Arteries* begin with a Trunk, and growing gradually less and narrower end in Branches so minute, that they escape the Sight, unless assisted with Microscopes; by which, in the Tails of *Tadpoles*, and very small *Eels*, the Extremities of the *Arteries* seem by the swift uninterrupted course of the Blood, to be continued to the Originations of the *Veins*, tho', thro' the transparency of those Vessels, the actual continuation be not visible. The *Coats* of them are of a very firm, close Contexture, by which means the *Blood* not being visible thro' them, they generally appear white. In these the *Blood* proceeding from a greater Capacity to a less, is thereby somewhat obstructed in its Passage; but being forced on by the motion of the *Heart*, distends the *Coats* of the *Arteries*, and thereby occasions that *salient Motion* which we call the Pulse.

Vein.

A *VEIN* is another *Fistulous Channel*, for the conveyance likewise of *Blood*; but its course is directly opposite to that of the *Arteries*. For instead of a Trunk distributed into Branches, and *Capillaries*, this is a Trunk form'd out of the concurrence of *Capillaries*, which receive the *Blood* from the *Arteries* in the

the respective Parts, and re-convey it to the *Heart*. In these the Blood coming from narrow Channels into wider, finds less opposition, and therefore less force is requir'd to drive it on. But to supply that want of Protrusion, the *Veins*, (especially those of the lower Limbs) are furnish'd with *Valves*, which are two *Membranes* placed opposite to each other in the Cavities of the Veins, closing 'em against any reflux of the Blood, and thereby sustaining the weight of it in the great Trunks. The impulse of the *Heart* being much broken in the *Capillaries*, and the Blood proceeding from narrow to wider Passages, the Veins have no Pulsation. For this reason it was not necessary that the *Coats* should be so strong and firm as those of the *Arteries*. However, they are in their Texture alike; but those in the *Veins* being thinner than those in the *Arteries*, and the Blood appearing thro' them, makes them look blue in Dissection, and not white.

A NERVE is a *round, white, long, smooth* *Nerve.* *Body, like a Cord, deriving its Origin from the Brain, or Spinal Marrow, and serving* (as is supposed) *for the conveyance of Animal Spirits.* The *Trunk* of every *Nerve* is cover'd with a very thin *proper Membrane*, and consists of innumerable slender *Fibres* infinitely divisible, which are dispers'd thro' every Part of the Body, where there is either *Sense* or *Motion*.

Gland.

A GLAND is a *soft, spongy, lax Body*, and furnish'd with a little *Excretory Duct*, or Pipe, thro' which it emits that *Fluid* for the *Secretion* of which it is fram'd. It is suppos'd by *Modern Anatomists* to be only a *Convolution* of the *Capillary Artery*, to which a *Capillary Vein* is join'd, which, with the *Excretory Duct*, make up the *Body of Glands*, the *Organs of Secretion*. The *Excretory Ducts* arise from the *Glands*, which they help to compose. They spring from the *Extremities* of the *Arteries* and *Veins*, and carry off a *Liquor* separated from the *Blood*.

The *Lymphatick Glands* have either *Lymphæducts* for their *Excretory Ducts*, or *Lacteal Vessels*, as in the *Mesentery*.

Lymphæducts.

The LYMPHATICKS, or LYMPHÆDUCTS, are *very small, fine, hollow Vessels*, generally arising from the *Glands*, and conveying back to the *Blood* a *transparent Liquor*, which from the resemblance it in shew bears to *Water*, is call'd *Lymph*. These, tho' not so visible as the other *Vessels*, because of their *Minuteness* and *Transparency*, are however existent in all *Parts* of the *Body*: But the difficulty of finding them has hinder'd them from being describ'd in many *Parts*.

Lacteal Veins.

The LACTEALS, are a *peculiar sort* of *Lymphatick Vessels* for the conveyance of *Chyle*, improperly call'd *Veins*, proper only to the *Mesentery* and *Intestines*, from whence they arise,
and

and through which they run. They are not always full, at least not of *Chyle*: When they are, which is when the Aliment is digested, and before it is pass'd out of the *Intestina Tenuia*, they appear white, at other times transparent, somewhat like the rest of the *Lymphaducts*.

CHYLE is a white Juice about the consistence of Milk, form'd out of the Parts of the dissolv'd Aliment, incorporated with the *Potables* by the *Peristaltick* Motion of the *Stomach* and *Intestines*, and thereby diluted, and render'd thin enough to enter the Mouths of the *Lacteals*, whence it is convey'd to the *Receptacle*, and thence unto the *Blood*, of which it is the first Matter and Substance. The taste of it, as we have experienced in *Dogs*, is somewhat *brackish*, which argues it to abound more with *Salts*, than *Milk* does.

MILK is also a white Liquor, but whiter, ^{Milk.} thicker and sweeter than the *Chyle* it self, from which it is deriv'd, and probably without much more Artifice or Alteration, than the leaving behind some *aqueous* and *saline* Particles.

BLOOD is a mix'd red Liquor, circulating ^{Blood.} in the *Arteries* and *Veins* of the *Body*, which while it is in the *Vessels* appears uniform: But when let out, and cold, separates spontaneously into a red and a transparent Part, of which the first is call'd *Cruor*, and the latter ^{Cruor, Serum.}

Serum. The *Cruor* consisting of Parts more *Fibrous*, is generally gather'd when cold into a *Coagulum*, and swims in the *Serum*, which still retains the form of a *Liquor*.

*Analysis of
the Blood.*

By the *Chymical Analysis* it is found to consist mainly of *Phlegm*, as the *Basis* or *Vehi- cle*, a great quantity of *Volatile Salts*, a good deal of *Oyl*, and some *Earth* or *Caput Mor- tuum*, out of which a small quantity of *Fixt Salt* may be extracted.

*Appear-
ance thro'
the Micros-
cope.*

By *Microscopical Observations*, whilst cir- culating in the *Vessels*, it is discern'd to con- sist of a great number of small *red Globules*, floating in a *transparent Liquor*, which are suppos'd to be the *Cruor* and *Serum*, which are so distinct when let out. But tho' the motion which is very *rapid*, may make the *Fibres* or *Filaments* of the *Cruor* appear round, and perhaps by a kind of *Whirling* or *Rotation* really convolute them, yet that their *Figure* is not *Globular*, when let out, may fairly be collected from their *Cohesion*, or *hanging toge- ther* in a lump, which *spherical Bodies* touch- ing one another but in a very small Super- ficies are not apt to do. But on the contrary, this Property argues an *implication* of their *Fibres* within one another.

Lymph.

The *SERUM* is sufficiently describ'd in the foregoing Article: But it affords another Li- quor little differing from it, in colour or con- sistence, or indeed in any other discoverable Quality: Except that the *Serum* is probably charg'd

charg'd with more recrementitious Parts. This Liquor is separated from it possibly in all parts of the Body for particular uses, and is return'd again to the Blood by peculiar Ducts of its own, and is therefore dignified with a separate Name, and is call'd the *Lymph*. This some would have to be the immediate Matter of Nutrition, which shall be examin'd in its proper Place.

SPIRITS have been *anciently* distinguish'd into three sorts, *Animal, Vital, and Vegetative*: But the *Moderns* have reduced them to one sort, *viz.* the *Animal*: About the Nature of which, and the Matter whence they are form'd, great Disputes have arisen among *Anatomists*: Tho' the Existence of them have not yet been demonstratively prov'd.

*Animal
Spirits.
Triple di-
vision of
Spirits.*

*of doubt-
ful Exist-
ence.*

It is hard to define what could never yet be brought under the Judgment of our *Senses*, so that every Man is at liberty to entertain what Notions he pleases concerning them, of which some have been extravagant enough. All that we shall offer concerning them (if they have a real Existence) is that they must needs be extream subtle Bodies, which escape all manner of Examination by the *Senses*, tho' never so well assisted, and pervade the Tracts of the *Nerves*, which yet have no discoverable *Cavity* or *Perforation*, nor could ever by any Experiment be collected, yet are *constantly moving* in vast Quantities, as they must of necessity be,

*Not defin-
able.*

of great
Antiquity in
Notion.

be, to perform all those mighty Operations, which are ascrib'd to them. However, the Antiquity of the Opinion claims some Reverence: By their help we are supply'd with a vast number of *precarious Solutions* of great *Phanomena*; and without them we must leave a great *Chasm* in the *Philosophical History* of *Animal Bodies*. They are suppos'd to be separated in the *Brain* from the *subtlest* parts of the *Blood*, and from thence to be carry'd by the *Nerves* to all the parts of the Body, for the performance of all *Animal* and *Vital Functions*. But of what peculiar Nature they are, we leave those to wrangle about, who are better satisfy'd of their Existence.

Bile.

of two
sorts.

BILE is a *yellow, bitter Juice*, separated from the *Blood* in the *Liver*, and from thence discharg'd by the common Duct into the *Duodenum*. It is of *two* sorts, one thinner, more mild, and more inclin'd to a greenish Colour than the other, and is separated from the Glands of the *Liver* immediately into the *Porus Biliaris*. The other which is separated from the Glands of the *Liver* likewise into the *Gall Bladder*, by *Roots* or *Ducts* proper to it self, is of a *brighter yellow*, of a *greater* consistence, and *more Bitter* and *Acrimonious*.

Analysis.

The *Bile* by *Chymical Analysis* affords some *Sulphur* or *Oyl*, some *Volatile Salt*, and a good deal of *Fixt Salt* (in which particular it differs

fers considerably from all other *Animal Liquors*) and a pretty quantity of *Caput Mortuum* or *Earth*, and in this as all the rest the *Basis* is *Phlegm*.

The *SALIVAL* and *PANCREATICK* ^{*Salival & Pancreatic Juices.*} Juices, resemble one another so nearly in their Quantities and Appearance, that we need not separate them in their Descriptions. They are *transparent Liquors*, consisting ^{*Analysis.*} chiefly of *Phlegm*, mixt with a *Volatile Salt*, and nothing else discoverable. The first separated by the Glands about the *Mouth* and *Fauces*: The latter by the *Pancreas*, which discharges it self into the *Duodenum*.

The *SEED* is separated in the *Testicles*, ^{*Seed.*} and contain'd in proper *Vesicles*, and is when well constituted a *white Liquor*, thicker than any other in the *Body*, consisting almost ^{*Analysis.*} entirely of *Oyl*, and *Volatil Salts*, which are blended together by the mediation of a little *Phlegm*. It's activity seems mainly to be deriv'd from the *Volatile Salts*, with which it abounds far beyond any other *Animal Liquor*.

The use of the *Microscope* has discover'd ^{*Animal-cules in the Seed.*} (as some fancy) floating in it several *Worm-like Bodies*, which move up and down as if they were alive, and have by *Mr. Leuwenhoeck*, the first discoverer of them, and divers others after him, been maintain'd to be real *Animals*, each of them a true *Fetus*, a little *Man*, whose shape likewise some pretend to dis-

discover by their Glasses: Of which Opinion we shall discourse more at large in the proper Place.

*Mucus
Urethrae.*

The *Genital* Parts afford likewise another Liquor which is *Viscous* and *Transparent*, and serves only to *line* and *lubricate* the Parts that the *Seed* may slip the more freely without adhering. This comes from Glands lately discover'd by Mr. *Comper* about the *Penis*, and is that which in Women is commonly mistaken for the *Semen*.

The *Mucus* of the *Joints*, is a *Mucilaginous Liquor*, separated by its proper *Glands*, conveniently placed in the *Interstices* of the *Bones*; where these Glands are gently prest by the Motion of the Parts. It serves to make the Extremities of the *Bones* or *Joints* slip easily.

*Mucus
Narium.*

The *Mucus* of the *Nostrils* is separated by its proper Glands, placed in the internal *Membrane* of those Parts, which shall be spoken of in its proper Place. As shall,

*Cerumen
Aurium.*

The *Ear-Wax*, which has also its proper Glands to separate it from the Blood, placed in the outward Passages of the Ears.

There are divers other *Excrementitious Humours*, such as the *Urine*, the *Sweat*, &c. which need no Description, and shall be spoken of with the Parts to which they belong.

C H A P.

C H A P. II.

Of the Cuticle or Scarf-Skin.

SYLLABUS.

Considerandorum in

* <i>Cuticula.</i>	{	<i>Adnascentia—Cuti</i>	
	{	<i>Tenuitas</i>	
	{	<i>Squamula</i>	{ <i>per Microscopium</i> <i>spectanda.</i>
	{	<i>Lamella</i>	{ <i>per Vesicationem</i> <i>spectanda</i>
	{	<i>Glandula</i>	<i>eodem modo.</i>
	{	<i>Pori</i>	{ <i>Pro Pilis</i> <i>&</i> <i>Excretoriis Cutis.</i>
	{	<i>Origo.</i>	
	{	<i>Usus.</i>	

* Vide
Tab. I.

THE Cuticle is a thin pellucid Membrane, void of Sense, and serving as a cover for the Skin. Cuticle.

Tho' it lies first expos'd to view, yet because of its close coherence to the Skin, it is very rarely discern'd from the Skin it self, but by *Anatomists*, who generally separate it by an *actual Cautey*, by which it appears to be a very thin and simple Membrane, which expos'd to the *Microscope* (as some pretend) appears to consist of Scales. Adherence to the Skin.

Tenuity.

Squamulae

But

Lamella.

But if instead of raising it by an *Actual Caustery* on a *dead Body*, we examine that which is raised by *Cantharides*, or any other *Vesicatory*, we shall find it to consist of several *Membranes* exceedingly thin and fine, and not altogether destitute of Bodies resembling *Glands*, which in that state become visible to the naked Eye.

Glandula.

Pores of the Cuticle.

It is extended over the whole Body, and being it self *insensible*, serves to defend the subjacent Skin which is *extreamly sensible*. It is full of innumerable *Foramina* or Perforations, as well for the *Hairs* as for the *Sweat*, and *Effluvia* of the Body, which pass by *insensible Perspiration*, yet not so full but that it obstructs that excessive discharge of serous Humours, which otherwise would be evacuated by the *Glands* of the *Skin*, as appears plainly by the great quantities discharged by *Blisters*, or any other Accident, whereby the Skin is denudated.

Origine.

Some would have it to be form'd from the grosser part of the *excrementitious serous Humours* eliminated through the Pores of the *Skin*, and condens'd upon the Surface, like the *Pellicle* which appears upon Evaporation on the Surface of the *Serum* of the *Blood*.

They that please themselves with this Fancy, are at liberty to enjoy it; Because it is not a Point worth controverting. But Monsieur *Lewenhoeck* with more probability
thinks

thinks it to be an Expansion only of the excretory Ducts of the Glands of the Skin.

It has no proper Vessels, at least none that have been discover'd by Anatomists: Yet having had the Curiosity to examine several times the *Cuticle* rais'd by *Vesication*, I have always found in it *Glands*, or Bodies like *Glands*, which were in that state pretty conspicuous, and pretty numerous, from whence it seems to me certain that there are Vessels, though not discoverable by the Eye, nor perhaps in *dead* Bodies by the *Microscope*; because of the Coincidence and Flaccidity consequent of Death, which may easily cause Vessels so exceedingly minute to disappear.

I could wish therefore that they who are furnish'd with good *Microscopes*, would examine the *Cuticle* taken off by *Vesication*, which I am perswaded would discover something yet unobserv'd.

C H A P. III.

Of the Skin.

SYLLABUS.

Notandorum in

Cute	{	Rete Vasculosum
		Structura
		Papilla Pyramidales
		Glandula Miliare
		Lineae { Rhomboidales
		{ Spirales
		Pori
		Crassities
		Connexio
	{	Usus

Cutis or
Skin.
Reticular
Vessels.

Structure.

IMmediately under the Scarf-Skin or *Cuticle* lies a **RETICULAR** Body of *Vessels* peculiar to that part, containing a mucous Liquor, from the Tincture of which, the Sagacious *Malpighius* imagines the colour of the Skin to be deriv'd: Which Conjecture he draws from his Observation, that the Skin as well as *Cuticle* of *Blacks* is white, and that they differ in no other Circumstance from those of *Europeans*, but in this particular.

The **SKIN** it self is in several Animals of a Texture very various, as appears by the differ-

different sorts of Leather made of Skins. That of *Hogs* and *Animals*, which have a *Membrana Adiposa* spread immediately under the Skin, approaches nearest the Human, which upon the Score of the vast multitude of *Sudatory Pores* (far exceeding in number those of *Creatures* cloath'd with Hair) is more loose and spungy. It consists of *Fibres* of its own, or according to *Steno* is form'd out of the Productions of the *Tendons* of the subjacent Parts, and furnish'd with an infinite number of PYRAMIDAL PAPILLÆ, which are most conspicuous in the Skin of the *Soles* of the Feet, and of the *Palms* of the *Hands*, and are interwoven with innumerable *Nervous Fibres*, which render it extremely sensible; and through those it becomes the immediate and proper *Organ* of the *Sense* of *Feeling*.

Papilla Pyramidales,

Among these likewise lie a vast multitude of *Glands*, which are call'd the MILIARY GLANDS, and are each of them serv'd with a Branch of an *Artery*, *Vein*, and *Nerve*, as also a proper *excretory Duct*, thro' which, the matter of *Sweat* and *insensible Transpiration* is secreted, and sent forth at the Perforations of the *Cuticle*.

Glandula Miliaries,

It is mark'd externally with a great number of LINES, which intersecting one another at acute Angles, make generally a Rhomboidal Figure, though in some places they

Lines.

Rhomboids

Spiral. they are turn'd *Spirally*, as at the ends of the *Fingers*: And in some likewise they are cut deeper, and are more apparent as in the *Palms* of the *Hands*, and at the *Flexures* of the *Elbow* and *Hams*, and *Soles* of the *Feet*.

Pores of two kinds. It is perforated every where with *PORES*, which are by *Anatomists* observ'd to be of two kinds, *greater* and *less*. Thro' the former of these the *HAIR* germinates, which is implanted with a kind of *Bulbous Root* into the *Papillæ* before mention'd, as are likewise the *FEATHERS* in *Fowls*.

Thickness. The *Skin* is by ordinary computation estimated to be about six times as thick as the *Cuticle*: But on the *Head* and *Back*, and under the *Heel* it is much thicker: In the *Palms* of the *Hands* and the *Sides*, on the *Face* and *Fore-head*, and especially on the *Lips* it is much thinner.

On the *Face*, *Penis*, and *Scrotum* it is softer than elsewhere, and on the *Neck*, *Back* and *Soles* of the *Feet* it is harder. But in different *Subjects* and *Climates* there is in respect of all these things a great variety and uncertainty.

Connexion It is generally connected to the subjacent Parts by the *Membrana Adiposa*, and its proper *Vessels*, *Arteries*, *Veins*, *Nerves* and *Lymphaducts*, as well where there is no subjacent *Fat*, as where the *Muscles* under it, as at the *Lips*, *Eye-brows*, and *Anus*, send *Fibres* into it. In

In some places it adheres so very loosely, that it is easily separated, as about the *Belly*, *Legs* and *Arms*: Tho' in these along the *Linea Alba* it is more firmly connected, and on the *Soles* of the *Feet*, and *Palms* of the *Hands*, so as not to be separated without difficulty. On the *Forehead* it grows to the *Flesh*, and almost all over the *Face*, especially about the *Ears* and *Lips*, where the *Tendons* of the *Muscles* end in it.

The use of it is to wrap up, and cover *use*. the whole *Body*, and to be a sort of a general *Emunctory*, and a proper *Organ* of *Feeling*.

Both the *Cuticula* and *Cutis* are liable to *Diseases*. several *Accidents* or *Morbid Alterations*, of which those of the *Cuticula* are most of them of little moment, and scarce worth minding, but for the deformity which they bring along with them, such as *Morphew*, *Freckles*, *Sun-burn*, &c. which are ordinarily cur'd with *Cosmeticks*, with which the *Ladies*, who are most studious of their *Beauty*, are generally not unfurnish'd.

The *LEPROSY* only, both for its obstina- *of the Skin* cy in resisting all manner of *Medicines*, as well as for its loathsomeness, and sometimes fatal *Consequences*, may demand the consi- *Leprosy*. deration of a *Physician*, and properly enough in this place: For, tho' the *Root* and *Cause* may justly be thought to lie elsewhere, yet the visible *seat* of it is the *Cuticula*, and *Surface* of the *Skin*.

Cause.

This Distemper arises from the same Cause, that most other Diseases of the *Cuticula*, and *Cutis* do, but in a more exalted Degree; for all of them proceed from thin *Salt* Humours thrown off from the Blood, and arrested by the density of the *Cuticula*, not affording them so free a Passage as the quantity of them requires. This Disease is much more frequent in hot Countries than with us, where the Heat of the Sun rarifying extremely the Humours of the Body, and subtilizing the Blood, causes and requires a more liberal Perspiration, in the course of which, the *Salts* (in their own Nature Volatile) are still more volatiliz'd, and thereby render'd more Acrimonious.

Lepra
Gracorum.

These *Salts* being by the appointment of Nature to be eliminated thro' the Pores of the *Skin*, along with the recrementitious *Serum* their proper Vehicle, are in hot Countries convey'd in greater plenty to the surface of the Body, by reason of the extraordinary rarity of the Pores from the heat of the *Climate*, than in these *Northern* Regions they ordinarily are, and sticking in their Passage in the thin dry Membrane of the *Cuticle*, the aqueous Parts, which are their Vehicle, slip away from them by insensible evaporation, and leave them there to corrode and fret it, 'till at length thro' the quantity so gather'd, the Membrane becomes dry, brittle, and white, which is the true and sole

sole Cause of the *Desquamation* or falling away in white Scales, which *whiteness* as well as the *brittleness* proceeds meerly from the quantity of these *Salts*, which are themselves white; and when the moisture is drawn from them, being aculeated, and having insinuated themselves into the Pores of the *Cuticle*, dissolve the continuity of it by their Points and Edges, which so dry'd and broken, is apt upon the least Attrition to fall off as in the manner above mention'd.

There is another kind of this Distemper, *Arabum*. which is call'd *LEPRA ARABUM*, (as the former is *GRÆCORUM*) from the frequency of it in those Countries, which, tho' different in appearance, carrying a dry Scabby Crust, seems to me however to differ only in degree. For, as in the former Case the Salts being left destitute of their Humidity, which was their Vehicle, are not so active, and therefore affect only the *Cuticle*, to which they are immediately contiguous, or perhaps the surface of the Skin, which is sometimes made rough and uneven by them; in the latter Case these *Salts* with their Vehicle crowding faster than they can be evaporated thro' the Pores of the Skin (being still *in Fluore*, and so more *Caustick*) corrode deeper, and eat not only the *Curicle*, but the *Excretory Vessels*, and Surface of the *Skin* it self,

which thereby spues out a Liquor somewhat thicker than usual, which when the thinnest and most aqueous Parts are evaporated, is condens'd into that *Crust* or *Scab* which is the *Pathognomonick* of this Disease.

Most Inveterate of all Cutaneous Diseases.

I have chosen to be more particular upon this Disease, because it is the most exquisite of all the *Cutaneous* Distempers, which seem to differ from it in nothing, but the extent of their Seat, and the strength and continuance of their Causes.

The Small Pox.

Thus the SMALL POX, not having its Foundation in any permanent habitual Indisposition, either of the Climate, or Body, has its Period within a limited time, sufficient to extrude the *Peccant Matter* thro' the Pores of the *Skin*. For in this Disease the *Salt Serum* of the Blood being by an accidental *Fever* (arising from other Causes, than the constant Habit of the Body, or Disposition of the Climate) thrown in great quantities upon the *Glands* of the *Skin*, acts much after the same manner with the corrosive Matter in the *Lepra Arabum*; that is, it frets the *Cuticle*, and surface of the *Skin*, much as the other does: But when the Blood is fully despumated, and no fresh extraordinary supply is sent to these Parts, the *Scabs* dry, and fall off, and the *Skin* recovers its former State, except that the *Eschars* of these Ulcers, which were then rais'd, generally remain visible ever after. Yet some-

sometimes the Matter being not very corrosive, nor very plentiful, the Impressions it leaves are so light, that the *New Cuticle*, that supervenes afterwards, is sufficient to obliterate them. Thus the Cause ceasing, the Effect does so likewise.

If therefore any Body shou'd call the *Small Pox* a temporary critical *Lepra*, coming upon an extraordinary occasion, I see no reason to impugn his Notion: And tho' the Treatment be, and ought to be different, it is because more respect is had to the Internal accidental Cause, than to the External Symptoms, and their Effects upon the Skin.

Why the *Small Pox* seldom visits any Person more than once in his Life time, has been a famous *Problem* much agitated with very little Success; and therefore, if I succeed in my Attempt to resolve it no better than others have done before me, I shall not think it any loss of Reputation, but shall freely wish others more Happy in theirs, when they undertake to reform my Notion.

I conceive therefore that the Alteration made in the Skin by the *Small Pox*, at whatever Age it comes, is the true Reason why that Distemper never comes again. For the distention, which the *Glands* and Pores of the Skin suffer at that time, is so great, that they scarce ever recover their *Tone* again, so

Why but
once.

Alteration in the
Skin the
Cause.

so as to be able any more to arrest the Matter in its Course outwards long enough, or in such quantity, as to create those *Ulcerous Pustules* which are the very *Diagnosticks* of the *Small Pox*. For tho' the same *Feverish* Disposition shou'd, and may again arise in the Blood, yet, the Passages thro' the Skin being more free and open, the Matter will never be stopt so there, as to make that appearance, from whence we denominate the *Small Pox*.

Features
why per-
manently
inlarg'd by
the Small
Pox.

Accordingly we generally observe, that in those Persons, who have been severely handled by the *Small Pox*; the *Face* (which is generally the fullest from the Obstruction which the Matter meets with upon the account of the greater Constipation of the Pores of the *Cuticle*, by reason of its being constantly expos'd to the Air) seldom returns to its former Dimensions. This enlargement I think is to be accounted for, from the Dilatation of the *Areola* of the *Glands*, and Pores of the *Skin*, and not from any Augmentation of the Substance it self.

I am the further confirm'd in this Opinion from the Observation, that Nurses and others, that attend closely upon Persons Sick of the *Small Pox*, are frequently so far affected with the Distemper, as to feel some very light Disorder, and, with or without that warning, to have two or three
Erup-

Eruptions. That it comes to no more I attribute to the free Course which the Matter has thro' the Pores of the *Skin*. With this also agrees the constant Observation, that People of Coarse-grain'd *Skins*, in whom the Pores are largest, are most favourably treated by this Distemper, which likewise constantly leaves fine *Skins* much coarser than it found them.

What has been said of the *Small Pox*, will suffice to solve the *Phænomena* of the *Measles*, *Scarlet Fever* and *Erysipelatous Inflammations* which differ only in degree, or occasion.
Measles, Scarlet Fever, &c.

This course and effect of these *Salt Serous Humours* are likewise applicable to the *Itch* and other *cutaneous* Eruptions, which we not designing a formal Treatise of here, leave others to apply as they see occasion, which it will be easie for them to do.

C H A P.

C H A P. IV.

Of the MEMBRANA ADIPOSA, and its
FAT, and of the CARNOSA seu Mus-
culosa.

SYLLABUS.

Considerandorum in

Membrana Adiposa	Pinguedo	} Pinguedinis
	Locus	
	Substantia	
	Usus	
	Incommoda	}
	Cellula Adiposa	
	Sub ea Panniculus Carnosus	

Fat.

IMmediately under the Skin lies the FAT, which is call'd in *Latin* *Pinguedo*, and in *English* by the general Name of *Fat*, in contra-distinction to the *Adeps*, *Serum* or *Suet* and *Leaf*, which are found in the Cavities of the *Abdomen*, and differ somewhat from each other in consistence.

Where
found.

This *Fat* is found all over the Body co-extended to the Skin it self except on the *Forehead*, the *Eyelids*, *Penis*, and *Scrotum*. In emaciated Bodies, instead of this *Fat*, we find a sort of flaccid transparent Membrane, which is nothing else but the *Loculi* or *Cellula Adiposa*, in which the *Fat* of Bodies in
good

good habit is contain'd, but which in these is wasted.

It is *in substance* a gross whitish Oyl, and is *what it is:* indeed nothing but the Oily part of the *Aliment*, separated from the *Arterial Blood* by the *Adipose Glands*, and carry'd by peculiar *Ducts* to the *Membranous Cells*, from whence it is transmitted to the *Blood* again by the *Veins*.

The *Fat* of both kinds serves as a natural Balsam to preserve the Body, and by mixing with, and enveloping the *Salts*, wherewith the *Blood* and *Serum* are highly saturated, keeps them from fretting and corroding the parts of the Body, through which they pass. It is thought likewise, not without great probability, to make a considerable part of the nourishment of our Bodies; and accordingly we find that the grossest, fattest Persons falling, into an *Atrophy*, do in process of time lose all their *Fat*: Which is always quite expended in such Cases before the Disease becomes fatal.

As it has its great and excellent uses, so it is not without its inconveniences likewise. For, corpulent Persons that abound with it, having their Blood too much charg'd, and all their Organs too much clogg'd with it, *Sensation* is damp'd, and they are apt to fall into a *Drowsie Lethargick Condition*, which sometimes ends in sudden Death. But the abundance of it seldom fails of being

ing attended with *Inactivity* and *Somnolency*, not only from the unweildiness of an overgrown Body, nor from the stuffing of the Cavities of the *Thorax* and *Abdomen* alone, which is sometimes so great as to obstruct in some measure the motion and expansion of the *Diaphragm* and *Lungs*, and so to produce a *Dyspnea* or difficulty of Breathing, and sometimes an *Orthopnea*, which arises from the pressure of the over-charg'd *Viscera* of the *Abdomen* upon the *Diaphragm*: But it is probable likewise that the quantity of *Fat* or *Oily* Particles being return'd into the Blood, and engaging and implicating the more subtle active Parts, hinder those Secretions from being made in the *Brain* in that quantity, which is necessary to a vigorous Animal Action.

*Membrana
Adiposa.*

THE *MEMBRANA ADIPIOSA*, if there be really any such *Membrane*, and that it be not rather the *exterior* Membrane of the *Carnosa* or *Musculorum communis*, which most Anatomists now agree it to be, is suppos'd to be the *Basis* of the *Fat*, to which the Cells wherein it is contain'd are fix'd.

*Panniculus
Carnosus.*

NEXT under the *Fat* lies the *PANNICULUS CARNOSUS*, which consists of a double Membrane, the upper of which makes the *Membrana Adiposa* before spoken of. The under, which is likewise call'd *MEMBRANA MUSCULORUM COMMUNIS* or *MUSCULOSA*, is in some places inter-

interwoven with pretty thick *Muscular* Fibres, which are suppos'd to contract and corrugate the *Skin*: Tho' this action of it is visible no where in a humane Body, except on the Forehead, or in some the whole Scalp. It is spread all over the Body, but very unequally in point of thickness, and has its *Arteries*, *Veins* and *Nerves*, from those of the subjacent Parts.

The particular use of it is to support, and use. be, as it were, a Basis to the Globules of *Fat*. It serves in general as all other Membranes do to wrap, defend and connect the Parts together. Its different Names taken either from the Structure, or the Site, have occasion'd some to multiply it, tho' thro' mistake only.

CHAP. V.

Of the Muscles of the Abdomen.

SYLLABUS.

Musculorum Abdominis	{	Obliqui	}	Descendentes
				Ascendentes
		Linea Alba		
		Recti		
		Pyramidales		
		Transversales		

NExt after the *Membrana Musculosa* appear the MUSCLES of the *Abdomen*, of which there are Five Pair.

*Obliquus
Descen-
dens.*

Of these the *outermost* are the *OBLIQUE DESCENDING* Pair, so call'd from the oblique Course of the Fibres, which run, from their rise above, slanting downwards towards the fore Part.

This is a very broad Muscle, covering each entirely one side of the *Abdomen*, and some part of the *Thorax*. It arises from the two last true Ribs, and five spurious ones, and is indented with the *Serratus Major Anticus* by five or six Digitations, each of which receives a Nerve from the Interstices of the Rib. It springs likewise from

from the Margin of the *Ilium*; and ends in a broad Tendon in the

LINEA ALBA, which is a white Line, ^{Linea Alba.} that runs from the *Cartilago ensiformis* to the *Os pubis*, dividing the *Abdomen* exactly in the middle, and is form'd out of the Tendons of the *Oblique* and *Transverse* Muscles.

The next Pair is the **OBLIQUUS ASCENDENS**, which lies under the lower ^{obliquus Ascendens} part of the former, running with a Course just contrary from the lower part upwards.

Its fleshy Fibres have their Origination from the Edge of the *Os Ilium*, and end at the *Costa Notha*: It terminates with a large double Tendon in the *Linea Alba*, the upper part of which ramping over the *Musculus rectus*, and the other creeping under it, and joyning together at the *Linea Alba*, do as it were sheath the *Musculus rectus*. Tho' sometimes towards the bottom of the Muscle this Duplicature is not so visible, but begins about the Navel, and so proceeds upwards.

These Muscles, as likewise the *Transverse*, are perforated in Men near the *Os pubis*, for the Passage of the *Spermatick* Vessels, and in Women for the *Ligamenta Uteri rotunda*. Thro' the lower of these Perforations in a Rupture or Dilatation of the *Peritoneum* part of the Intestines sometimes slip, and make that Tumour which is call'd a *Bubonocoele* or Inguinal Rupture.

D

The

Rectus.

The next is the **MUSCULUS RECTUS**, so call'd, because its Fibres run strait along the Belly from the *Sternum* and *Cartilages* of the *Ribs* to the *Os pubis*.

The Belly or *Venter* of this Muscle is distinguish'd by three, sometimes four Tendinous Lines or Inscriptions, according to the Number of which some have reckon'd it so many several Muscles: Others as a Muscle of so many Bellies. They have been apt likewise to Dispute which was the *Head*, and which the *Tail* of this Muscle, which being a dry Speculation of no great use, I shall not trouble the Reader with any other Decision, than that he may reckon either of them indifferently *Head* or *Tail*.

Pyramidalis.

After these comes the **PYRAMIDALIS**, which being but a small Muscle, tho' it lies upon the lower part of the *Rectus*, is usually taken notice of after it, because till the *Rectus* is rais'd, it is not so distinctly apparent.

It has its Name from its Figure, and its Origin from the superior and inferior Margin of the *Os pubis*, with a pretty broad fleshy Head, from whence it rises, and grows gradually narrow till it ends in a small, almost round Tendon, in the *Linea Alba*, sometimes almost at the Navel.

This

This is sometimes a single Muscle, and ^{Sometimes} in some Subjects not found at all: But where ^{single,} it is solitary, it is generally found (as some ^{sometimes} Authors say) on the Left side. ^{wanting.}

The last is the TRANSVERSE, so ^{Transver-} call'd from the Course of its Fibres broad- ^{salis.} ways cross the *Abdomen*. It is the lowest in Situation, and lies immediately upon the *Peritoneum*, which it sticks close to. It arises from the Transverse Processes of the *Vertebra Lumbares*, from the lower Rib and interior Margin of the *Os Ilium*, and is inserted with a broad Tendon like a Membrane into the *Linea Alba*.

All these Muscles receive Branches of *Ar-* ^{Arteries} *teries* and *Veins* in the upper part from the ^{and} *Mammaries*, which exert themselves about ^{Veins.} the *Cartilago Xiphoides*, and below from *Epigastricks*, on each side from the *Intercostals*, and *Lumbals*.

Under those Muscles, but more particularly under the *Recti*, run the principal Branches of the *Mammary Arteries* and *Veins*, which latter have been observ'd to have very numerous Inosculation with the *Epigastrick Veins*, of which *Verheyen* tells us, that he observ'd some Hundreds in a Dog. Under the *Transverse* and *Oblique* run the *Intercostals* and *Lumbals* in most plenty, tho' 'tis probable all of them are serv'd by each, unless perhaps the *Pyramidalis*.

Nerves.

They have their *Nerves* from the *Inter-costals* and *Lumbals*, which usually bear the Blood Vessels company.

Use.

These *Muscles* serve not only as a Wall and Defence to the *Viscera*, contain'd in the *Abdomen*: But likewise by their Contraction to streighten the Cavity of the *Abdomen*, and by that means to promote the descent of their Contents thro' the *Intestines*, and to force it into the *Lacteals*; and to serve as Antagonists to the *Sphincter Ani* and *Vesica*, and forcibly expel the Excrements of those Parts, and likewise of the *Fetus* in Parturition. They are also instrumental towards *Exspiration*, by drawing down the Ribs, and upon this account are to be look'd upon as assistant Antagonists to the *Intercostals*, and other Muscles that promote *Inspiration*. They are likewise the chief, if not only, Organs or Instruments of *Vomition*, which Action is vulgarly, tho' falsely imputed to the Stomach, of which more largely hereafter.

C H A P.

C H A P. VI.

Of the Peritonæum

SYLLABUS.

Notabilium in

Peritonæo	Figura	
	Duplicatura	
	Superficies	{ Externa
		{ Interna
	Glandula	
	Connexio	
	Ligamentum	{ Suspensorium
		{ Hepatis
	Processus	
	Involucrum	{ Ligamenti
		{ rotundi Uteri
	Arteria	
	Vene	
	Nervi	
	Lymphaductus	
	Usus	
	Morbi	

THE Muscles of the *Abdomen* remov'd, *Peritona.*
the PERITONÆUM displays it um.
self, which is a *thin, soft, smooth Membrane,*
covering and containing all the Viscera of the
lower Belly.

Figure.

Its Figure in the natural State answers that of the lower Belly, and makes a kind of irregular Oval.

Duplicity.

It is every where double, but more plainly so from the *Navel* to the *Os Pubis*: Where likewise in Women it is thicker for the conveniency of Distention in the time of Gestation.

External Surface.

Its *External* Surface is somewhat rough and fibrous from its Connection with the Muscles: But the *Internal* is exactly smooth, and lin'd with an unctuous Humour (to facilitate the sliding of the *Intestines* along it) which is separated by a Number of small Glands, which in Hydropical Bodies grow larger and more visible, as the Membranes themselves do likewise thicker.

Glands.

Connexion.

It is connected on the outside to the *Transverse* Muscles of the *Abdomen*, and *Linea Alba*, below to the *Os Pubis* and *Ischium*, on the side to the *Os Ilii*, behind to the *Os Sacrum* and *Vertebrae Lumbares*, especially the first and third. From which it is said by many to have its Origin, and where likewise the Duplication is again very visible, not only upon the account of its remarkable thickness, but from its spontaneous parting to receive the *Kidnies* betwixt the *Lamina*. It is also reflected from the inferiour Surface of the *Diaphragm* to the Superiour, or Convex Surface of the *Liver*, which it suspends, and this part of

Ligamentum Suspensorium Hepatis

it

it is call'd *Ligamentum Suspensorium Hepatis*.

The Exterior Coat has two Processes, in Men falling down into the *Scrotum*, and wrapping up the *Spermatick* Vessels, where they are likewise dilated, and make the *Tunica Vaginalis* of the *Testes*. In Women they form an *Involucrum* for the Round Ligament of the Womb. Ignorant Surgeons, not knowing precisely where these Processes pass the Perforations of the *Obliqui Descendentes*, sometimes mistake Ruptures for Tumours of another kind, and attempt Suppurations, that might be fatal, if prosecuted: And sometimes *Vice Versa*, put Trusses upon Apostemations, that ought to be open'd.

It receives *Arteries* and *Veins* in the upper part from the *Mammaria* and *Diaphragmatica*: In the lower from the *Epigastrica* and *Sacra*: And on each side from the *Lumbares*.

The *Nerves* come out of the *Os Sacrum*, and the Loyns.

Olaus Rudbeck pretends to have discover'd *Lymphaticks* in it, which are seldom mention'd by Authors, because seldom visible, but in *Hydropical* Cases, and therefore not often seen. In *Morbid* Cases great quantities of *Serum* have often been found between the *Duplicatures* of this Membrane, when there has been none beneath

it in the Cavity of the *Abdomen*. This is the true *Tympany*, and is frequent in Women, whose *Ovaria* are probably in such Cases first affected, at least they are then scarce ever unaffected, tho' all other Parts be sound.

Use.

The Use appears to be Simple, to contain and keep in their place the *Viscera* of the *Abdomen*, which is so manifest, that, whenever the *Peritonæum* happens to be broken, or extraordinarily dilated, some of them are very apt to fall out of their place, and to form those sorts of Tumours, which are call'd from the Parts displac'd *Enterocoele* and *Epiplocoele*: And those are again divided according to the Parts they fall upon, as a Rupture of the *Guts* falling upon the *Navel* is call'd *Omphalocoele*, which is an Accident that happens frequently to Children, sometimes to Women upon hard Labours; and is often seen in Dogs, who from the Horizontal position of their Bodies have a greater weight, and bearing of the *Intestines* upon that part than any other of their Body.

Several kinds of Ruptures.

Omphalocoele.

Bubonocoele.

Enterocoele
Epiplocoele.

Enterocoele
Epiplocoele.

The next is the *Bubonocoele*, which is the falling down of the *Intestines* thro' the Perforation of the *Musculus Obliquus Descendens*. In the *Scrotum* such a descent of the *Intestines*, or *Omentum* being the most usual kind of Rupture, it is call'd *Enterocoele*, or *Epiplocoele*, or from both together *Enterocoele*, or *Epiplocoele*.

All

All these sorts of Ruptures are occasion'd by Blows, violent Concussions, overstretching in Vomiting, hard Labour, or Wind, from which latter Cause it is that Ruptures are so frequent in Children, and so easily help'd by timely Care.

There are other Tumours, which from their outward appearance are also call'd *Ruptures* vulgarly. But these, relating to the *Common* and *Proper Teguments* of the *Testes*, shall be spoken of elsewhere.

C H A P. VII.

A View of the Viscera of the Abdomen in their Natural Situation, &c.

SYLLABUS.

Viscerum Abdominis in Situ spectandorum amoto

Peritoneo	{	<i>Funiculus Umbilicalis</i>	<i>Arteria dua</i>
			<i>Vena dua</i>
			<i>Urachus</i>
	{	<i>Omentum</i>	
		<i>Intestina</i>	
		<i>Ventriculus</i>	
		<i>Mesenterium</i>	
		<i>Lien</i>	
		<i>Hepar</i>	
		<i>Renes</i>	
		<i>Vesica Urinaria</i>	

THE *Peritoneum* remov'd gives us the view of the Parts in their Natural Situation, as they lie dispos'd one among another.

Funiculus Umbilicalis.

Of what consisting.

The first, that appears, is the **FUNICULUS UMBILICALIS**, of which care must be taken, that it be not cut in dividing the *Linea Alba*, which it perforates. It consists of three sorts of Vessels, a *Vein*,
two

two *Arteries*, and the *Urachus*, which soon after the Birth dry up, and become *Ligaments*.

The next to be consider'd is the *OMENTUM*, which is spread almost all over the *Intestines*, and covers the superior part of the *Abdomen*. *Omentum.*

The *Omentum* taken away, the *INTESTINES* are discover'd variously contorted and connected almost thro' their whole length to the *Mesentery*: The *Thick* ones lying uppermost, and the *Thin* underneath, and together filling the greatest part of the *Umbilical*, and *Hypogastrick Regions*. *Intestines.*

In the *Left Hypochondrium* immediately under the *Diaphragm* lies the *STOMACH*, which if it be empty, and the *Thorax* unopen'd, is scarce seen, unless it be forcibly elevated, and brought forwards. *Ventriculus or Stomach.*

On the *Left Side* of the *Stomach* lies the *SPLEEN*, which, unless bigger than ordinary, is quite hid by the *Stomach* and *Diaphragm*, and impending parts of the *Thorax*, and therefore must be drawn a little out of its *Natural Site* to be plainly seen, before the *Thorax* is open'd. *Lien Spleen.*

The *LIVER* is a very bulky *Viscus*: But, because the *Diaphragm* in dead *Bodies* is very much concave towards the *Abdomen*, even this too is almost hid by the *Diaphragm* and *Cartilages* of the *spurious Ribs*: So that it is hard to shew its *Posture* likewise, 'till the *Tho-* *Hepar Liver.*

Thorax be open'd. Therefore to display the contain'd Parts of this Region, either the *Thorax* with the *Diaphragm* must be forcibly lifted up, or the *Lungs* so strongly inflated that the *Stomach* and *Liver* may be driven downwards. By the first way you see them as in violent *Expiration*; and by the latter as in the Act of ordinary *Inspiration*.

Renes or
Kidnies.

The KIDNIES and VESICA URINARIA require somewhat more help to make them discover themselves. On each side in the *Loins* lie the *Kidnies*, entirely hid, and cover'd by the ambient Parts, which must be remov'd by the Hand before they can be come at.

Vesica U-
rinaria or
Bladder
of Urine.

Lower yet in the *Pelvis* of the *Abdomen*, partly under the *Os Pubis* lies the BLADDER of URINE, which likewise needs some help, though not so much as the *Kidnies*, to have a sight of it.

Confus'd
Site of the
Viscera
occasions
frequent
Errors in
the Diag-
nosis of Di-
stempers.

The confus'd Order, wherein divers of these Parts seemingly lie perplex'd and intermix'd with one another, has occasion'd many Mistakes concerning the Seat of Internal Abdominal Pains, in some of which a great deal of Judgment is requir'd to distinguish nicely: As between *Hypochondriacal*, *Colical*, *Nephritical* and *Lumbal Pains*. So likewise *Inflations* of the *Intestines*, particularly of the *Colon*, often

Pains in
this Region
hard to be
exactly dis-
criminated

often impose upon *Physicians* for indurated *Spleens* and *Stirrhou Livers*, only by seeming to point by some extraordinary *Intumescence* and *Hardness* at the Regions where those *Viscera* lie.

TAB.

T A B. I.

F I G. I.

PART of the *Cuticula* rais'd from the *true Skin*, as it appears by a magnifying Glass after it has lain ten Days in common Water.

A The *Inferiour* or *Internal* Surface of the *Cuticula* next the *Cutis*.

B The *exteriour* Surface of the *Cutis* next the *Cuticula*.

a a The *Hairs*, which are common to the whole Body, and were rais'd with the *Cuticula*.

b b Their *Bulbous* Roots, as they appear'd when drawn out of the *Foramina*, that received them in the *Cutis*.

c c The *Foramina*, or holes of the *Skin*, whence the Roots of the *Hairs* were extracted.

F I G. II.

THE *Abdomen* open'd to shew its *Viscera* in their Natural Situation. In this subject the *Skin* and *Fat* were taken off the upper part of the Body and Arms, to shew their external Muscles: The Right Arm lying in that Action call'd *Pronation*; the Left in *Supination*.

A A, The *Internal* Surface of the *Skin* covered with the *Fat*.

B B, The *Internal* Surface of the *Peritoneum*, as it appears, when the Muscles with it are divided cross-ways at the Navel, and their four corners turn'd out to shew the Parts contain'd.

a The *Navel* cut out, and left to shew the *Ligaments* in Adults call'd

b The *Urachus*:

c c The two *Umbilical Arteries* turn'd down.

C The *Vena Umbilicalis* also chang'd to a Ligament, here turn'd up, where part of the *Ligamentum suspensorium Hepatis* may be also seen Ψ.

D Part

D Part of the *Convex Surface* of the *Liver in situ*.

E Part of the *Stomach* also seen in this position.

F F F The *Omentum* as it usually appears lying on the Guts. Here its Blood Vessels may be seen that pass from the Stomach to it, call'd the *Arteria* and *Vena Gastrica Epiploica dextra* and *sinistra*.

G, Some of the *small Guts* not cover'd by the *Omentum*, as they lie on the beginning of the *Colon* in the right *Ilium*.

d Part of the *Musculus Cremaster*, as it descends on the process of the *Peritoneum*, that incloses the *Spermatick* Vessels in their progress to the *Testes*.

e, The *Bladder of Urine*, distended with Wind to make it appear in this Position.

f, *Os Pubis*.

g, The *Ensiform Cartilage*.

H H, The two *Pectoral Muscles in situ*.

h, *Os Pectoris* or *Sternum*.

I, *Musculus Quadratus Colli* or *Platysma Myoides* covering

i, The *Mastoides*,

k, The *Masseter*, and

l, The *Parotid Gland*.

K Part of the *Clavicula*.

p, Part of the *Musculus Elevator Scapulae*, and

q, A portion of the *Cucullaris*, covered by the *Quadratus Colli* also.

m, The *Musculus Zygomaticus*, and

n, The *Temporalis*.

o, *Os Jugale*, and *Musculus Orbicularis Palpebrarum*.

L *Musculus Deltoides*.

M, *Gemellus*.

N, *Brachialis internus*.

O O, Parts of the *Serratus Major Anticus*, by which may be seen (in the Shade) a portion of the *Latissimus Dorsi*.

P, The *Biceps* in both Arms.

Q Q, *Radialis extensor Carpi*.

R, *Supinator Radii Longus* in both Arms.

S, The *Extenders* of the *Thumb*.

T, *Extensor Digitorum Communis*.

V, *Extensor Minimi Digiti*.

W, *Anconaeus*.

X, *Ulnaris Extensor*.

Y,

Y, Part of the *Ulnaris Flexor Carpi*.

Z, *Abductor Minimi Digiti*.

r, The *Interossei*, as they appear on the Back of the Hand.

s, The *Flexor Carpi Radialis* in the Left Arm.

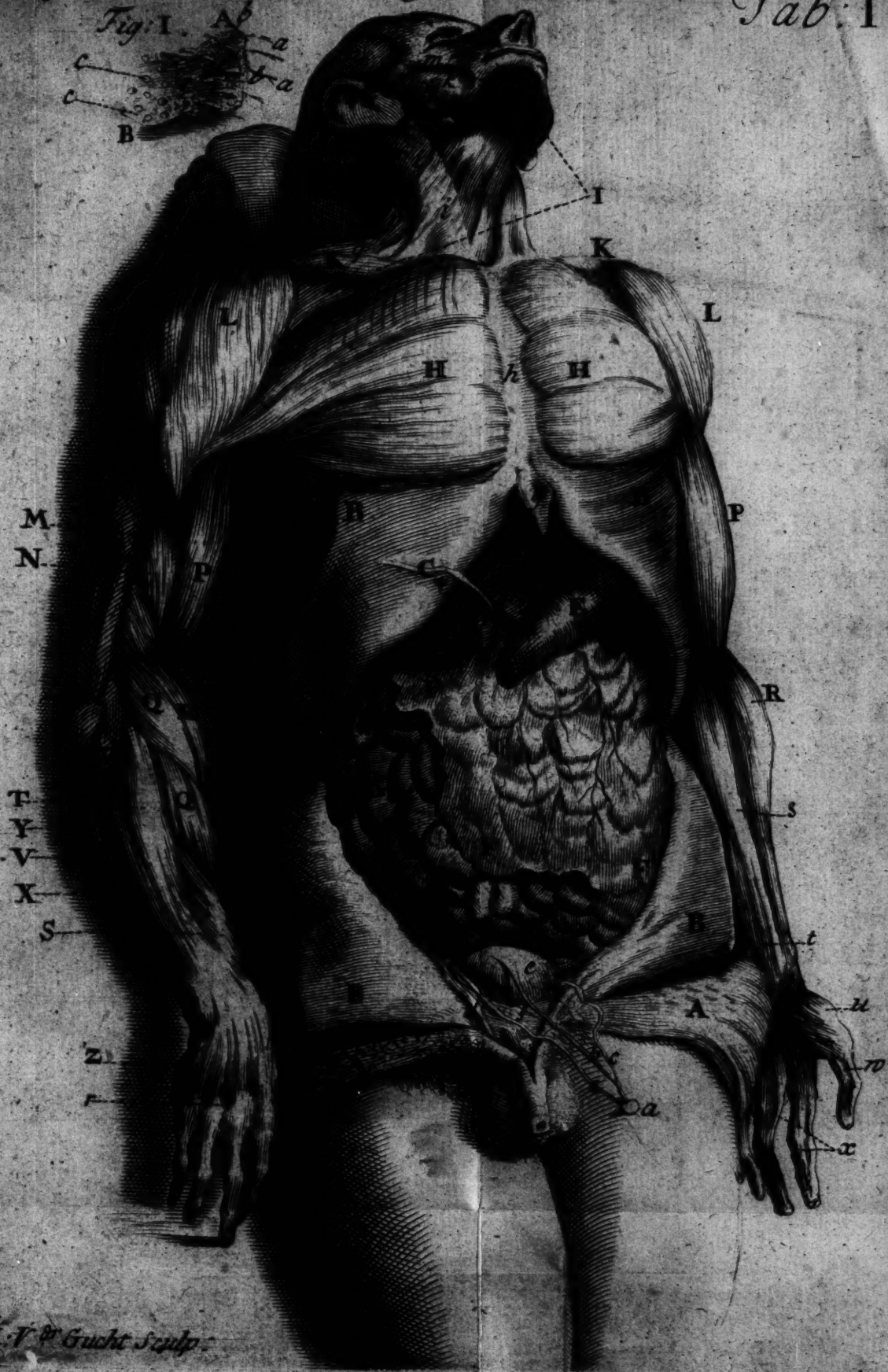
t, Part of the Tendon of the *Palmaris longus*.

u, *Abductor Pollicis*.

w, The Tendon of the *Flexor Pollicis longus*.

x, The Tendons of the *Musculi Flexores Digitorum Perforans* and *Perforatus*.

C H A P.



Of

Eorum

Omento

THE
Ret
Names it
is a memb
upper Ext
the *Stoma*
Liver, to
to that pa
the *Stoma*
It is spread
having its

C H A P. VIII.

Of the Omentum, or Caul.

SYLLABUS.

Eorum quæ in conspectum veniunt in

Omento {
 Duplicatura
 Vasa Adiposa
 Areola
 Cavitas
 Figura
 Pondus
 Capacitas
 Vasa sanguifera
 Cellula Adiposa
 Connexio
 Adeps
 Usus.

Tab. II.
 Fig. II.

THE OMENTUM, EPIPLOON, *Omentum*,
Rete or *Reticulum* (for by all these
 names it is variously call'd by Authors)
 is a membranous thin Part, connected at its
 upper Extremity chiefly to the bottom of
 the *Stomach*, to the concave Part of the
Liver, to the back side of the *Duodenum*,
 to that part of the *Colon*, that lies under
 the *Stomach*, to the *Back*, and to the *Spleen*.
 It is spread immediately over the *Intestines*,
 leaving its other Extremity loose.

E

It

Duplica-
ture, or
Leaves.

Vasa Adi-
posa.

Arcola.

Cavity.

It consists of *Two* Membranes or Leaves betwixt, and on the Surface of which innumerable *Veins, Arteries, Nerves,* and *VASA ADIPOSITA*, or *Fat Vessels*, running variously cross, and intersecting one another, divide it into a multitude of little *AREOLÆ*, resembling the *Masbes* of a fine *Net*. The *Fat* in its proper Ducts running along with the other Vessels, and together with them, renders those divisions of the *Arcola* obscure, while the intermediate Spaces are fill'd with a transparent Membrane, full of small Holes, so that the whole in shew seems to be a beautiful kind of *Net*.

These Leaves form a considerable *Cavity* like a large Purse or Sachel, into which, if a Blow-pipe be thrust below the Stomach, it may be blown up to the capacity of a Gallon. Its bottom is fasten'd to the small Guts. Tho' these Membranes be of a Texture too rare to retain the Flatus long, yet the Experiment suffices to shew the Continuation of the Trunks of the Blood Vessels from the *Stomach, Duodenum, Colon* and *Vas Breve* into it. Some have made this *Sacculus* the Seat of divers Distempers, but I think without sufficient Ground, except in Dropsies, and therefore shall not take notice of them here.

In several Subjects it is of an unequal Extent, in some not reaching beyond the Navel,

Navel, in others being large enough upon a Rupture of the *Peritonaum* to fall down into the *Scrotum*. *Hippocrates* lays it down as one of the occasions of Sterility in Women, when being too Fat, it lies too heavy upon, and compresses the *Os Uteri*. Perhaps this Conjecture of his is founded upon his Observation, that *Barren* Women are apt to grow *Fat*, and that those which are *Prolifick*, usually grow *Fat*, when they have done Bearing, and so may ascribe their ceasing to Bear, to their growing *Fat*; whereas I shou'd rather impute their growing *Fat*, to their ceasing to Bear.

The ordinary *Weight* of it is about half a *Weight* Pound; tho' sometimes it has been observ'd very thick and hard, and in *Hydropical* People to amount to several Pounds weight.

Its *Arteries* come from the *Celiac* and *Mesenteric*, and the *Veins* run to the *Porta*, especially the *Splenic* Branch of it, and are call'd *Epiploica*, and some, which are common to the *Stomach* as well as the *Omentum*, are call'd *Gastro-epiploica*. Its *Nerves* come from the *Intercostals*, and are not large.

The *Fat* here, as in the *Membrana Adiposa*, is either separated into the *LOCULI* or *ADIPOSE CELLS*, and from thence deliver'd into the *Ductus Adiposi*: Or else is brought by them to these *Adipose Cells*. For the extream Fineness and Transparency of

Extent Vessels.

Cellula Adiposa.

Doubt concerning the Ductus Adiposi.

of these Vessels, as well as of their Liquor, renders it exceeding difficult to trace their Origin or Course: And indeed it remains something doubtful, whether they be hollow and real Ducts or not, or whether they be only Fibres, such as are observ'd in the *Spleen*, along which the liquid *Fat* does as it were drill its way, as the easiest it can find.

Opinion of
Malpi-
ghius con-
cerning
'em.

The accurate *Malpighius*, the first nice Observer of this Part, and Discoverer of these Ducts (if such they are) inclines to the former Opinion: And indeed it is hard to entertain any other. All that is certain concerning them, is, that they discharge themselves, or terminate in little oily Globules of *Fat*, concerning the farther Use and Progress of which, much remains still to be discover'd.

Other
Doubts of
Malpi-
ghius.
Concerning
their Ori-
gin.

MALPIGHIVS himself starts several ingenious Doubts, which he recommends to further Prosecution: *First*, Whether these *Adipose Ducts* be not propagated from the Fibres which abound in the *Spleen*, or those Fibres from them: One of which he is induc'd to suspect from the Similitude of these Fibres to those, which he finds in the *Omentum*, and from the Communication and Continuation of some Fibres, which he observes between them, whereas those of the *Spleen* seem to have none with the *Blood Vessels*.

His

His other Doubt is, whether there may not yet be any undiscover'd Communication between the *Omentum* and the *Membrana Adiposa*: And whether by means of its Connexion with the Back, its Vessels may not be propagated into every Region of the Body by the Mediation of this Membrane, which is spread over it, and so be as it were the common Root of the *Fat* all over the Body.

Concern-
ing their
Propaga-
tion thro'
the Body.

Neither is he more certain yet, whence this *Omentum* is supply'd, for besides the *Spleen* before mention'd, *Malpighius* offers to our Consideration two other Fountains, viz. the *Stomach* and the *Glands* of the Body. The first he suspects upon the account of the Connexion of the *Omentum* with it, and the latter upon Observation, that they are generally accompany'd with *Fat*, and from the Taste of them, which he thinks they are beholden to the *Fat* for.

Concern-
ing the
Source of
their *Fat*.

But, as he does, so do I think this Matter deserves a farther Inquiry, for I cannot think any of those the real source of it, and must content my self with deriving it from the Blood in general, without assigning the immediate Organs of its Separation.

Deserving
a farther
Inquiry.

As *Anatomists* are hitherto deficient in assigning the true source of the *Fat*, so are they likewise in my Opinion about the Uses of it.

Uses of the
Fat.

Retarding
the Acri-
mony of the
Salts.

Suppling
and Lubri-
cation.

Nourish-
ment.

The first and principal Use of the *Fat* in general is to implicate and curb the Acrimony of the Salts of the Blood, which otherwise wou'd be apt to Fret and Corrode the Parts thro' which it passes, especially those which are Membranous and Vesiculous, and accordingly in *Lean* Persons we observe, that they are more liable to *Catarrhs*, and other Distempers arising from Acrimonious *Serum*. It serves likewise to Anoint and Lubricate the several Parts, and to make them move Commodiously; And is likewise suspected by many to serve as Nutriment to the Body, which Opinion is supported by the common Observation, that *Fat* Persons grow *Lean* by long Abstinence, and that some Animals, which in the Summer Season feed Plentifully, and grow *Fat*, will at the approach of Winter withdraw and hide themselves, and Live all that Season without Food, and appear again in the warm Weather *Lean* and Shrunk, which is an Argument that the *Fat* which they gather in the Summer-Season, serves 'em for Nutriment in the Winter. This Opinion is countenanc'd by other Observations, that most of those Animals retire very *Fat*, especially the *Tortoise*, which has peculiar Vessels containing an extraordinary Stock of *Fat* along the *Intestines*, which probably serves for his Winter's Sustenance. This Use supposes a return of it into the Blood, which

which is very probable, tho' the particular way of its Passage is not yet discover'd.

I am of Opinion likewise, that it serves as a sort of a *Natural Balsam* to preserve the other Parts from Corruption. For as all *Oily* Bodies are more particularly Exempted from Putrefaction than others, so in an Animal Body all the other Parts are subject to speedy Putrefaction, the *Fat* only well separated from the rest, will keep without Putrefying. It may perhaps be objected, that after Death Corpulent Bodies Purge most, and Putrefie soonest: But that does not arise from the quantity of *Fat*, but from the abundance of mixt Humours, which are apt to Ferment and Putrifie, and of which emaciated Bodies are almost destitute, and therefore not liable so soon to Putrifie.

The particular Use of the *Omentum*, with regard to its Situation, is to assist the *Peristaltick* motion of the *Intestines* by Lubricating them with its *Oily* Substance, which transudes thro' its Pores, and by following them in their doublings and windings, and thereby serving them as a soft Bolster to slide upon, and, by their filling up the Hollows, preventing their being too much distended with *Flatulencies*, yet giving way to 'em when repleted with Aliment. It may have some further Effect by cherish-

Serves as a Natural Balsam to preserve the Body.

Use of the Omentum.

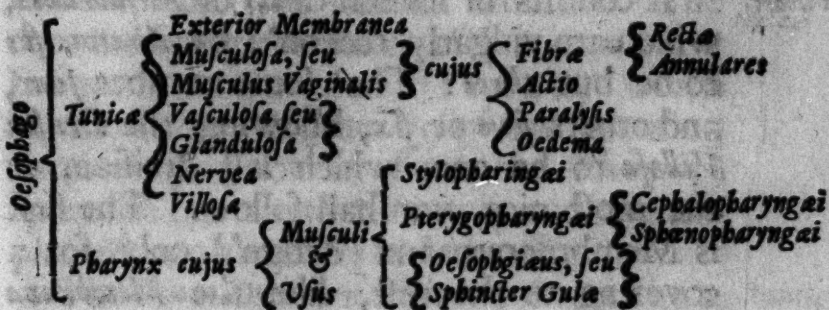
ing the *Intestines* with its Warmth; but that, tho' it has been fancy'd to be its primary Use, cannot be much, because it is not naturally warmer than the *Intestines* themselves, and their comfort of that kind must be mutual,

CHAP.

CHAP. IX.

Of the Oesophagus.

SYLLABUS.

Eorum quæ videntur in

TH^o the OESOPHAGUS proper-<sup>Why treat-
ed of here.</sup>
ly belongs to another *Venter* of the
Body, yet being the Channel thro' which
every thing we take is convey'd to the Sto-
mach, and being of a substance so nearly
resembling to it, that they seem to be but
a Continuation or Expansion of each other:
I thought fit to premit the Account of it
to that of the *Stomach*, that the Action of
the latter might be consider'd intire.

The OESOPHAGUS, GULA, or GUL-^{Oesophagus}
LET is a *Membranous Pipe* descending from
the Mouth to the STOMACH, between
the *Aspera Arteria* and the *Vertebra* of the
Neck and Back in a strait line, except a
little

little deflexion about the fifth *Vertebra* of the *Thorax*, where it turns somewhat towards the Right, to make way for the *great Artery*, which runs along with it to the ninth, where turning again towards the last, it crosses over the *Artery*, and piercing the *Diaphragm*, ends at the Left *Orifice* of the *Stomach*.

Its Coats.

It consists of several *Coats* or *Membranes*, which are vulgarly reckon'd by *Anatomists* to be but *three*: Tho' some number *four*, and others *five* or *six*, allowing the *Crusta Villosa* to be one, which last division, as the most nice, we shall follow. The first is Membranous and design'd only for a covering to the rest, like the *Membrana Musculorum Propria*, which it resembles, and seems only a continuation of the outward Membrane of the *Stomach* deriv'd from the *Peritoneum*: Tho' some *Anatomists* derive this of the *Oesophagus* from the *Pleura*, others from the *Diaphragm*, &c. a Controversy of no great Importance, and scarce worth the decision.

Exterior Membrana.

Tunica Musculosa, seu Musculus Vaginalis.

The second Coat is *MUSCULAR*, consisting of strong fleshy Fibres, like other Muscles, so that it seems to make the *Gula* a hollow fistulous Muscle. According to *Steno* and *Willis* it consists of two orders of Fibres, going from top to bottom in *Spiral Lines*, contrary to, and decussating each other.

The

This description is very exact of the *Gullet* of *Ruminants*, but not so of that of Men: And it is probable, those two great Men before mentioned fell into this Error by examining the *Oesophagus* of Brutes only, and thence concluding too hastily that the Structure was the same in *Humane*.

In Men this Coat consists of two fleshy *Lamella*, like two distinct Muscles. The outward being compos'd of **STREIGHT LONGITUDINAL FIBRES**, which in the descent of the *Oesophagus* growing narrower, (not far from the *Pharynx*) approach one another nearer, and are implanted into the Parts underneath.

The *Inner* Order of *Fibres* is **ANNULAR** without any observable Angles, tho' it is easie by drawing it either upwards or downwards to make them appear Angular, with the Angles pointed towards the force, which may have impos'd upon some. But when under no violence they appear perfectly round.

The use of this Coat and these Orders of *Fibres* is to promote *Deglutition*, of which the *Longitudinal*, when in contraction, shorten the *Oesophagus*, and so make its capacity larger to admit of the Matter to be swallow'd. The *Annular*, on the contrary, in their Action, contract the capacity, and closing behind the descending Aliment, press it downwards. So that these two

two Orders of Fibres seem to be Antagonist Muscles to one another, yet by different Actions both conspire to the same end, the *Protrusion* of the *Aliment*.

Illustration

Tumours of the Gula.

This Action of these Fibres is further evinc'd and illustrated by those *Oedematous* or *Schirrous* Tumours, which sometimes happen on this Part, which render *Deglutition* difficult, especially of *Fluids*. For *Solids*, being capable of the impresson of these Fibres, and the assistant Muscles, are, tho' with difficulty, forc'd thro' the obstructed part in bulk and quantity as they descend thither: But *Fluids*, not having resistance enough to force the Tumour, are apt upon compression to return upon the *Fauces*, and cannot pass but in a *Filet* or *Thread* answerable to the space left open by the Tumour, and therefore are a long time in passing.

Paralysis.

On the contrary in a *Paralysis*, when the Tone of the Fibres is resolv'd, yet the bore of the Gullet not obstructed, *Fluids* pass with equal ease, as if the part were not disaffected: But *Solids*, wanting the force of the Muscles and Fibres, cannot be got down.

Tunica Vasculosa.

The next Coat which is call'd the *VASCULAR*, consists of a double Membrane. The outward form'd of irregular Fibres, and innumerable Vessels, interwoven, from whence it is call'd the *Vascular*.

The

THE INNER TUNIC consists of streight *Glandulosa* Longitudinal Fibres somewhat fleshy, mixt with abundance of little Glands, from whence it has been esteem'd a distinct Coat, and is call'd the *Glandulous*. This Membrane adheres firmly to that within it, which is call'd

THE NERVOUS Coat, and is extremely fine, made up of excessive slender Fibres variously dispos'd. This Coat is continu'd to that which covers the *Fauces, Mouth and Lips*, whence it comes, that tickling the bottom of the *Fauces* by vellicating this Membrane, provokes a Reaching to Vomit. This Membrane is the Instrument of Sensation, in this Part, and as some think the seat of *Thirst*, or the Organ whereby the Appetite of *Drink* is produc'd. *Nervosa.*

This Coat is lin'd inwardly with a vil- *Villosa.* lous Crust which is not reckon'd among the *Tunics*, which I look upon to be the Excretory Ducts of the Glands, and, not unlike the *Cuticula* to the *Cutis*, to serve to defend the subjacent Membrane.

In case of Excoriations by sharp Humors *Rejected sometimes by the Mouth.* it has sometimes been brought up at the Mouth, when the upper Orifice of the Stomach has been clos'd by Tumors, which case seems to differ only in the circumstances of the part affected, and the way of evacuation from the like Excretions in *Dysenteries*.

This

This Membrane so cast up, does not ill resemble the *Cuticula*, as it appears when rais'd by Vesication; and perhaps there is as near a resemblance between the Nature of their Causes as to the Kind and Degree of Acrimony, both proceeding from Volatile Animal Salts, tho' one be External and Artificially procur'd, the other Internal and Spontaneous, or Fortuitous.

Pharynx.

The upper opening of the *Oesophagus* situated at the bottom of the *Fauces* is call'd PHARYNX. This being the place where the Action of deglutition commences, and where it is mainly perform'd, it is assisted by or rather compos'd of three pair of Muscles.

Par Stylopharyngeum.

The first which is call'd STYLOPHARYNGÆUM arises round and fleshy from the *Processus Styloides*, and in its oblique Descent becomes thicker, and afterwards is expanded on the back parts of the *Fauces*, between the double Series of Fibres of the following Muscles.

These when they act, draw up and dilate the *Pharynx*.

Par Pterygopharyngeum.

The PTERYGOPHARYNGÆUM arises from the *Processus Pterygoides*, where the Tendon of the *Musculus Pterygostaphilinus* is reflected. Some fleshy Fibres of it spring likewise from the upper Jaw-Bone behind the farthest Grinder, and some from the sides of the Tongue, and *Os Hyoides*. From all these places its fleshy Fibres pass Semi-circularly,

circularly, and meet with those of the opposite side in a middle Line on the back part of the *Pharynx* externally. In the internal Surface of the *Fauces* is another Order of fleshy Fibres that decussate the former at acute Angles. These rise not only from the sides of the *Uvula*, but also from the Root of the Cartilage excavated for the *Meatus a palato ad aurem*, and descend obliquely, to their Insertions in the Glandulous Membrane of the *Pharynx*, as far as the *Cartilago Thyroides*.

This Muscle serves not only to constrict ^{use.} the *Pharynx*, but likewise to compress the *Tonsils* and force out their *Mucus*, upon which score it is likewise employ'd in promoting *Hawking*.

Valsalva, who has lately given us a new ^{These multiplied by Valsalva.} Account of the Muscles of these Parts, denies the Existence of this part of this Muscle, which springs from the *Processus Pterigoides*, which however, is constantly and regularly found. The same Author has likewise of two other parts of this Muscle, long since describ'd and figur'd by Mr. *Cowper*, made two distinct Muscles, and given them two new Names. The part springing from the Tongue he calls *Glossopharyngeus*, and the other part immediately below it *Hyopharyngeus*.

The

And by many others before him upon the Score of their various Origination.

Cephalopharin-
gæus.
Sphæno-
pharin-
gæus.
Oesopha-
giæus seu
Sphincter
Gulæ.

The various *Originations* of the several Parts of this Muscle have caus'd it to be generally divided into several Muscles: whence come the *Cephalopharyngæus* and *Sphæno-pharyngæus*, which as those of *Valsalva* before mention'd, are only parts of various Origination, which concur in forming this Muscle.

The *OESOPHAGIÆUS*, which is generally accounted a *circular* Muscle, is strictly no more than a Production of the foregoing Muscle, whose Fibres surrounding the *Pharynx*, form a *Tendinous* Line on the back part of it, but it being connected on each side to the *Cartilago Thyroides*, has been thought to arise from thence, and is by *Verheyen* taken for a pair of Muscles conspiring to form a sort of *Sphincter* by their Concurrence. But in these things *Anatomists* are so little agreed, and they are differences of so small Importance, that it is not worth detaining the Reader to reconcile them.

Use.

It closes the *Gulæ*, and helps to thrust down the Aliment when enter'd. In which Action it is assisted by the *Musculous* Coat of the *Gulæ*, which is by some reckon'd among the proper Muscles and call'd *Musculus Vaginalis Gulæ*; but is already describ'd here among the Coats.

Vaginalis
Gulæ.

C H A P.

C H A P. X.

Of the Stomach.

SYLLABUS.

Eorum quæ in conspectum veniunt in

Ventriculo

Situs
Figura

Orificia { Cardia
Pylorus }
{ Parietes
Fibra
Sphincter
Antrum }

Magnitudo

Tunica { Membranea.
Muscularis—in qua Fibrarum
Nervæ }
{ Ordo duplex se intersecantium
Fasciculus Longitudinalium
Motus Peristalticus }

Crusta Villosa { Plicæ
Usus }

Arteria Gastrica { Dextra
Sinistra }

Vena { Coronaria
Vas Breve }

Nervorum Ramus { Exterior
Interior }

Lymphatica

Vide App.
Tab. 25,
26.

TO the end of the *Oesophagus* is fasten'd the **S T O M A C H**, which lies immediately under the *Diaphragm*; and is partly cover'd on the right side by the *Liver*; having on its left the *Spleen*. It is in Figure somewhat like a Bagpipe, and has two Orifices. The Left or Superior appended to the *Oesophagus*, seems in reality to be no more than a Continuation or Expansion of it: It

F is

Cardia. is in Greek called *Καρδία*; The Right or Inferior Orifice is continued to the *Duodenum*, and is called *Πυλῶρ*. This Orifice is narrower than the other, and extended to the *Duodenum* by an oblique Ascent; which Structure, (quite contrary to the other which enters the *Stomach* almost perpendicularly with a greater Capacity, that the Aliment may come easily in) is given to it to hinder the Aliment from passing too precipitately out of the *Stomach*, before it be sufficiently dissolved. For this reason likewise it is furnish'd with an extraordinary Series of Fibres, which serve to constringe and contract it more than any other part of the *Stomach*; which running circularly round it, serve as a kind of *Sphincter*, which is open'd by the Contraction of the *Stomach*, and by the appulse of the Chyle.

*Circular
Fibres, or
Sphincter
of the Py-
lorus.*

*Antrum
Pylori.*

At the bottom of the *Pylorus* is a large Cavity, which *Willis* calls the *Antrum*, and assigns to it the Office of keeping the first digested Chyle, till that which was later taken into the *Stomach* be digested. But if it be true as *Dr. Wharton* observes, that there are *Vena Lactea* in the bottom of the *Stomach*, such a Provision seems unnecessary, and the most fluid part of the Chyle has then another Passage; but the Existence of these is disputed.

The *Stomach* is largest on the left side, and grows straiter and straiter, as it proceeds towards the *Pylorus*. Its

Its *Magnitude* is various, and less, generally in Women than in Men; though in these likewise it varies very much, and is largest in those that are accustomed to eat and drink liberally. *Magnitude*

The *Coats* of the Stomach are generally *Coats*. reckon'd but three; the inner of which is cover'd with a Mucous Spongy Lining like very fine Hair, as in the *Oesophagus*, call'd the *Crusta Villosa*, and is, in my Opinion, as that is, nothing but the *Excretory Ducts* of the *Glands*.

The *Exterior* is that common one which is deriv'd from the *Peritoneum*. This Coat is every where very thin about the Orifices, and at the bottom it is much thicker, and furnish'd with Fibres somewhat like *Muscular*, and as if they serv'd for Motion. *Exterior Coat or Membrane,*

The *Second or MUSCULAR Coat* consists of thick fleshy Fibres, of two Orders *Second or Muscular Coat.* *Inward* and *Outward*, and are so disposed as to intersect each other on all parts of the Stomach at right Angles. The *Inward* run obliquely towards the left upon the upper part of the *Ventricle*: but on the under part they reflect towards the right. *Two Orders of Fibres.*

In this outward Order or *Lamina* upon the upper part of the Stomach, is a remarkable Parcel, or *Fasciculus*, of Fibres, which pass from the left Orifice *Longitudinally*, and terminate in the right, entering the *Antrum* of the *Pylorus*. *Fasciculus of Longitudinal Fibres.*

Use of this
Coat.

The Office of this Coat is to constringe the Stomach, and drive its Contents towards the *Pylorus*, as likewise by the joint Action of its Fibres of both Orders, to make the PERISTALTICK or *Vermicular* Motion, which begins at the left Orifice of the Stomach, and is continued through the whole Tract of the Intestines, as may be seen in all live Dissections. In this Motion the *Longitudinal* Fibres seem to have the least share; and rather serve as Antagonists to the rest: In their Contraction by approximating the two Orifices of the *Stomach*, they hinder the too hasty Expulsion of the Contents.

Peristal-
tick Mo-
tion.

Use of the
*Longitudi-
nal* Fibres.

Nervous
Coat.

The *Third* Coat is NERVOUS, and consists of Fibres variously interwoven, with numerous Blood-Vessels and Glands.

Its Use.

This Tunic serves for *Sense*, and by the Pricking of some Humours upon this Coat, *Appetite*, or the *Sense* of *Hunger*, is supposed by most Authors to be rais'd; the Ground of which Opinion shall be examin'd hereafter. Its Glands likewise may contribute something towards that Quantity of Mucous Humour, which is found in the *Stomach*.

*Crusta Vil-
losa*.

The CRUSTA VILLOSA is by some Authors reckon'd a fourth *Tunic*, and perhaps not unjustly. On the Inner Surface of this, are to be seen innumerable *Villi* or fine *Fibrilla*, rising perpendicularly every where

where out of it, which some will have to serve for nothing but a Defensative to the *Stomach*, to preserve it from acrimonious Humours. But I think them to be the *Excretory Ducts* to the subjacent *Glands*, Its Use. which many Authors would have to be (that now exploded thing call'd) a *Parenchyma*, but which are indeed the Organs, by which most of that Humour, which is discharg'd upon the *Stomach*, is separated, and these *Villi* the immediate Channels through which it is convey'd.

The Inner Surface of the *Stomach*, when it is not distended by the Contents, is full of *Wrinkles* and *Folds*, made by the *Nervous Coat* and *Crusta Villosa*, which, being co-extended to the *Muscular Coat* in its utmost Distention, and not Contractile, as that is, must, when that is in its Contraction, lye thus folded and wrinkled. But in hard Drinkers, and in *Stomachs* usually distended with Flatulencies, the Tone of the *Muscular Coat* being destroy'd, the Inner ones lye plain, and even with it. Inner Surface, or Plicæ of the Stomach.
Hard drinking or Flatulencies destroy the Tone.

By the means of these *Plicæ* the *Nervous Coat*, which is not contractile, but yet extremely sensible, is preserv'd from being painfully stretch'd, when the *Stomach* is distended: Some will likewise have them to serve to be a stop or check to the sliding of the *Aliments* too soon out of the *Stomach*; but this seems not a genuine use of it, be- Use of the Plicæ.
Not to stop the hasty Course of the Aliment.

cause, when the *Stomach* is at its full Distention, which should be the necessary time of checking, the Surface is then more plain, and when the *Stomach* is quite empty, and there can be none of that use, the Corrugations are then greatest.

Nor to
keep a Re-
serve of
Stale
Chyle for
a Fer-
ment.

Dr. *Glisson* and *Willis*, and after them most *Anatomists*, have thought, they serv'd likewise, and that principally too, to stop and keep a reserve, a stock of *old Chyle*, which they thought by the stay in the *Stomach*, to be exalted into a kind of *Ferment*, which serv'd not only to stimulate the Coats of the *Stomach*, and to excite Appetite; but also as a *Menstruum* to ferment and dissolve the future Aliment. To this Opinion I shall speak more largely elsewhere, and therefore shall leave the Reader to think of it as he pleases in this place.

Vessels.

The *Vessels* of the *Stomach* are very numerous. Its *Arteries* come from the Branches of the *Celiac* both Right and Left, and are call'd the *Gastricks*. Its *Veins* go to the *Porta*, some immediately into the *Trunk*, and some into the *Splenic* Branch. The first are call'd the *Right Gastricks*; and the other the *Left*. To these comes another large *Vein*, which runs along the whole length, and with its Roots embraces almost the whole *Ventricle* whence it springs, and is therefore call'd the *Coronary*. It sends off likewise some Branches which joyn with the

Coronary
Vein.

the Splenick Branch at the *Spleen*, which are by *Anatomists* call'd the *Vas Breve*; but *Vas Breve.* should more properly be call'd *Vasa Brevia*, because of their number. Through those Vessels the Ancients thought that a Melancholick Humour was convey'd from the *Spleen* to the *Stomach*, which serv'd to velligate the Membranes of it, and to excite Appetite. But this Fancy is refuted by the discovery of the Circulation of the Blood, which has demonstrated, that nothing comes through those Vessels from the *Spleen* to the *Stomach*; but that on the contrary, Blood is convey'd from the *Stomach* into the *Splenick* Vein, and by that to the *Vena Porta*.

Its NERVES are considerable both for *Nerves.* Number and Magnitude, and come from the Trunks of the *Par Vagum*, which, descending along the *Oesophagus*, are divided into two Branches *Interior* and *Exterior*, of which the Interior Joyning again together from one Trunk, which falls down along the *Oesophagus*, to the out-side of the left Orifice of the *Stomach*, and from thence spreads it self all over the bottom of the *Stomach*. The Exterior Branches likewise joyning a little lower, descend to the inner side of the same Orifice, and from thence diffuse themselves over all the upper part of the *Stomach*. It receives likewise some Branches from the *Plexus* form'd in the

Abdomen near the *Stomach*, by the Branches of the same Nerve, which is call'd the *Plexus Cardiacus*.

Lymphaticks.

The External Surface of it is plentifully cover'd with *Lymphaticks*, which discharge themselves into the *Receptacle of Chyle*.

C H A P.

C H A P. XI.

Of the Intestines.

SYLLABUS;

Quaerendorum in

Intestinis	Numerus	
	Tunicæ	
	Connexio	Vide App. Tab. 27.
	Divisio in	{ Tenuia
		{ Crassa
	Motus Peristalticus	
	Longitudo	
	Amplitudo	
	Glandulæ	{ Minores Conglomerata Tenuium
		{ Majores Solitaria Crassorum
	Vasa Sanguifera	
	Nervi	
	Usus	
	{ Duodenum—in qua Oscula Ductuum	{ Biliarii
	Tenuia { Jejunum	{ Pancreatici
	Ileum—in quo Valvulæ Conniventes	
Crassa	{ Cecum seu	
	{ Appendicula Vermiformis	
	Colon in quo—	{ Valvula
		{ Ligamenta
	Rectum in quo Musculi—	{ Sphincter
		{ Levatores Ani

THE INTESTINES which seem *Intestines.*
to be nothing but a Continuation of
the Stomach, consisting of the same Num-
ber of Coats, fabricated in the same man- *Coats.*
ner, are protended with various Circumvo-
lutions

lutions and Inflexions to the *Anus*, thro' which they discharge the Excrementitious part of their Contents out of the Body.

Connexion. They are, when separated from the *Mesentery*, to which they are all along connected, of a very great Length, ordinarily about six times as long as the Persons whose they were. And tho' they seem to be but one continu'd Channel or *Fistula*: Yet because in several Parts their Magnitude, Figure, and Thickness are different. They are in general divided into the *Thick* and *Thin*: And these again are each of them sub-divided into Three; the three *Thin* are call'd *Duodenum*, *Jejunum* and *Ileum*: And the *Thick*, *Cecum*, *Colon*, and *Rectum*.

Division into Tenuia and Craffa.

Number.

Peristaltick Motion.

They have all of them in common a kind of *Vermicular Motion*, which, beginning at the *Stomach*, is propagated downwards, and is call'd the *PERISTALTICK Motion*. To facilitate that they are generally lubricated with a great deal of *Fat*, especially the *Thick Ones*, whose Surface being somewhat more uneven, and the Contents less fluid than those of the *Thin*, they need somewhat more to make them slide easie.

Duodenum.

The first of the *Thin Guts* is call'd *Duodenum*, and reaches from the right Orifice of the *Stomach*, as far as the *Vertebra* of the Back on the left Side, where, at the first Angle made by the *Intestines*, it ends, which

which is about twelve Inches : From which *Its Length.*
Measure it seems to have taken its Name.
This Measure however is very far from being very Exact, as being much too largely computed.

Into this Gut, the *Gall Duct*, and *Pan-creatick Duct* empty themselves: And their several Liquors mix with the *Chyle*. *Orifices of the Ductus Communis, and Pancreaticus.*

The next Intestine is the *J E J U N U M*, *Jejunum.* so call'd because it is generally found more empty than the rest: Which may be occasion'd partly by the Fluidity of the *Chyle*, which is greater in this Intestine, than in any of those that follow it. And partly by its Capacity, being somewhat larger than that of the *Duodenum*, and therefore it gives a freer Passage, and perhaps also the Irritation of this Gut thro' the Acrimony of the *Bile*, which is discharg'd upon the *Intestines* a little before the beginning of this Gut, may contribute something towards accelerating the Passage of the Contents. However it may seem sufficient to some, that thro' the great Number of *Lacteals*, with which this Gut abounds more than any other, the Descent of the Contents, here stript of the most fluid Parts, shou'd in the rest be more sluggish, by reason of their greater Consistence.

This *Intestine* is allow'd to possess almost *Its Length.* the whole *Umbilical* Region, and its Length is generally computed to be about twelve, or thirteen Hands breadth. The

Ileum.

The *I L E U M*, which is the third Intestine, is situated below the *Navel*, and fills the *Ilia* with its numerous Folds and Convolutions. It is the longest of all the

Its length.

Intestines, being esteem'd to be one and twenty hands long: But these Estimates are somewhat arbitrary, because it is not exactly settled among *Anatomists*, where the *Jejunum* ends, or the *Ileum* begins; neither is it easie or necessary to do it. In both this and the preceding Intestine, the *Inner Tunic* is much corrugated, the loose Folds of which have been thought to do in some Measure the Office of Valves, and have therefore by Authors been call'd *Val-*

Valvula Conniventes

vula Conniventes, which are fram'd as in the *Stomach*, only by the Inner Coat being larger than the Outward.

Cacum.

Next to this follow the *Thick Intestines*, the first of which is call'd the *CÆCUM*, which has a lateral Insertion into the upper end of the *Colon*, and is not perforated at its other Extremity, but hangs to it like the Finger of a Glove, and is about three or four Inches long.

Use obscure.

The true use of this part is not yet determin'd: And some late *Anatomists* have thought, that the Name likewise is mistaken, not allowing this to be the *Cacum* of the Ancients, which they imagin'd to be that thick globous part of the *Colon*, which is immediately appended to the *Ileum*, and there-

therefore they have given this part the Name of *Appendicula Vermiformis*. But this is a Controversie not worth deciding, and therefore I shall pass it over. *Appendicula Vermiformis.*

This *Cacum* or *Appendix* is proportionably bigger in Infants than Adults; and in many other Animals, even smaller than in Men, and is at the unperforated Extremity slightly connected to the Right *Kidney*.

The next of the *Thick Intestines* is the *COLON*, which is much the largest, and most capacious of them all. It begins at the *Cacum*, and is with that connected to the Right *Kidney*, thence with a winding course it proceeds towards the *Liver*, where it is sometimes ty'd to the *Gall-Bladder*, and by that ting'd with Yellow. From the *Liver* it runs a-cross under the bottom of the *Stomach*, where it is by very fine thin Membranes fastned to the *Spleen*, and marches over the Left *Kidney*, where its Cavity is sometimes very much streightned, and descending so to the bottom of the *Os Ilium*, and from thence returning to the upper part of the *Os Sacrum*, and there making the Figure of a Circumflex, it ends in the *Rectum*. *Colon.*
Connexion

At the entrance of the *Ileum* into this Gut is placed a *Valve* form'd out of the Production of the inward Coat of the *Ileum*, which, like the Finger of a Glove, when its Extremity is cut off, hangs loose in the Cavity *Valve.*

Cavity of the *Colon*, by which means it stops the return of the Excrements, tho' sometimes, as in Inversions of the *Peristaltick Motion*, it proves not sufficient for that Use. It has a great many *Cellule*, or as it were distinct Cavities fram'd by a Coarctation of the
Ligaments Gut by two *Ligaments*, or Bundles of membranous, fleshy Fibres about half a Finger broad, each running on each side the Gut opposite to each other, the whole length of it, and as it were girding it in at certain distances, thereby making it resemble a Glass *Incorporator* used now a-days to mix Oyl and *Vinegar*.

The next and last of the *Intestines* is the
Rectum. RECTUM, which reaches from the *Os Sacrum* to the *Anus*, and is plain without Cells; It is fast ty'd to the *Ossa Sacrum* and *Coccygis* by means of the *Peritoneum*, and in Men to the Neck of the Bladder of Urine, in Women to the *Vagina Uteri*, to which it is strongly connected by a Membranous Substance. That Substance of the *Vagina* and *Intestine* are hardly distinguishable from one another.
Connection

The *Length* of this Gut is ordinarily about a hands breadth and an half, and its Capacity about the thickness of three Fingers; Its lower end the *Anus* is furnish'd with three Muscles.
Length

The first of these is a *Circular Muscle* serving to shut the *Anus*, and keep the Excrements
Sphincter Ani.

crements from coming away involuntarily, and is call'd the SPHINCTER ANI. It is near two Inches broad, and hangs down below the *Intestine* it self near an Inch. It is fastned on the sides to the Bones of the *Coxendix*, and behind to the *Os Sacrum*: Before in Men to the *Musculus Accelerator Urinæ*; In Women to the *Vagina Uteri*. Some would make this two Muscles, and some three; but that distinction seems not very instructive; and perhaps not well grounded, and therefore as such I shall lay it aside.

The other two Muscles are call'd the *Levatores Ani*, and have their rise on each side, from the inner lateral part of the *Ischium*, and end in the *Sphincter* before described. These serve to retract or pull back the *Sphincter* after the Expulsion of the Excrements; which, especially after hard Stools, is apt to be too far protruded, and to need the Assistance of these Muscles to reduce it. Mr. Comper in his *Myot. Reform.* Cap. V. says, That in their Progress to the *Anus*, they on both sides pass close over the *Prostata*, which they compress in *Coitu*, as they also do the *Vesicula Seminales*, and oblige those parts to void their Contents into the *Urethra*, in which Action the *Diaphragm* and *Abdominal Muscles* co-operate.

There are farther to be consider'd in the *Intestines* a great number of GLANDS, which Glands of the Intestines.

which in the *Intestina Tenuia* are gather'd together in heaps, as it were like bunches of Grapes: In these Intestines they are very small, and were it not for their Coacervations, scarce remarkable. But in the *Intestina Crassa* they are much larger, not gather'd like the others but dispers'd; and though very numerous, come under the Denomination of SOLITARY Glands.

Conglomerate in the small Guts.

Larger but Solitary in the thick ones.

These Glands discharge a Liquor into the Intestines, whether ordinarily for any thing more than Lubrication of the Intestines, and diluting their Contents, I will not determine: Though through these seems the greatest part of the discharge to be made; which either upon extraordinary Fluxes, or upon the Administration of Catharticks, we have frequent occasion to observe.

Blood Vessels.

Duodena.

Hæmorrhoids Internal and External.

These Intestines in general are furnish'd with Blood from the *Mesenterick Arteries*, which is return'd by the *Meseraick Veins*: But the *Duodenum* receives a Branch of an Artery from the *Celiac*, which is call'd DUODENA, to which answers a Vein of the same Name, that likewise returns the Blood to the *Porta*, and the *Rectum* others, which are call'd HÆMORRHOIDS; the *Internal* from the *Inferior Mesenterick*; and the *External* from the *Hypogastrick*, with Veins corresponding of the same Name, that also that go to the *Porta*. These Vessels spread the Intestines with abundance of Ramifi.

Ramifications, and are frequently diversify'd in several subjects of the same *Species*; much less are they to be depended upon for an uniform Appearance in Animals of a different Kind.

The NERVES of the *Intestines*, come *Nerves*, some of them from those of the *Stomach*, and some from the great *Mesenterick Plexus*, which distributes Branches to all the *Intestines*.

The remaining Vessels of the *Intestines*, are the *Lymphaducts* or *Vena Lactea*, of which in the following Chapter.

C H A P. XII.

Of the Mesentery, Lacteal Veins, Receptaculum Chyli, and Ductus Thoracicus Chyliferus.

SYLLABUS.

*Spectandum in MESENTERIO, &
LACTEIS quæ sunt in*

Mesenterio	{	Divisio	} Adiposa
		Origo	
		Membrana	
		Vasa	
		Figura	
		Peripheria	
		Glandule	
		Lactea	
Valvule in Lacteis.			

Lacteis	{	Receptaculum Chyli	—cujus	{	Divaricatio
		Ductus Thoracicus			Oscula in Subclaviam

Mesentery. **T**HE MESENTERY (so call'd, because it is in the middle of the *Intestines*, and connects them together) consists of a double Membrane, variously interwoven with a diversity of Vessels, Nerves, Arteries, Veins, Lacteals, Adipose Ducts, and Glands.

It

It has been ordinarily divided into two *Division.* Parts, the *Mesaraum*, and *Mesocolon*, the first appended to the *Intestina Tenuia*, and the latter to the *Crassa*. This is a Division of no great Moment, and therefore no farther to be insisted on.

The *Origine* of the *Mesentery* is deriv'd *origine;* from the first and third *Vertebra* of the Loins; where the Productions of the *Peritoneum* form two strong Membranes, which being joyn'd together make the *Mesentery*.

Between these two is a third Membrane discover'd by the Learned Dr. *Wharton*, thicker than either of the other two, and perhaps as some *Anatomists* think properly to be look'd upon as the *Adipose Membrane*, *Adipose Membrane;* abounding both with *Blood* and *Adipose Vessels*, wherewith the *Mesentery* is ordinarily plentifully stor'd.

The Figure of it is near *Circular*, tho' for *Figure;* want of room lying in Folds and Wrinkles, it seems but of small Extent, yet when Expanded, it is about four Ells in *Circumference.* *Circumference.*

Its Vessels are the same that we have accounted for in the preceeding Chapter.

It has, interspers'd up and down, many *Glands*, which in a sound State are ordinarily cover'd with *Fat*, most of which seldom exceed the Magnitude of a small Nut, and are in Number and Position so various

and uncertain, that it is in vain to attempt to give a certain Account of them, as to these Particulars.

*Pancreas
Asellii.*

In some Brutes, especially Dogs, there is a large Gland found in the middle of it, which by *Asellius*, was call'd the *Pancreas*, to which most of the *Lacteal Vessels* resort; and from thence the *Chile* is convey'd by large Vessels, but not so numerous as those before spoken of, which have their rise immediately from the *Intestines*, and are call'd *Lactea Secundi Generis*, which Division will scarcely be made out in Men, by any visible Distinction, their *Lacteals* not being gather'd so uniformly to one Part, but distributed indifferently to all the *Glands* of the *Mesentery*.

Uses.

The *Use* of the *Mesentery* it self seems to be, First, To gather the *Intestines* into a narrow Compass, that the Course of the *Chyliferous Vessels* towards their *common Receptacle* may be but short; and next to cover and protect them and the *Blood Vessels*; And, Thirdly, So to connex and dispose the *Intestines*, as to secure them from an Entanglement, which might hinder their *Peristaltick Motion*.

*Origine of
the La-
cteals.*

The *LACTEAL VESSELS*, or *VEINS*, proceed in great number from the *Intestina Tenuia*, especially the *Jejunum*, from whence they arise in greater number than from the rest. It is yet a Doubt among

among the *Anatomists*, whether the *Intestina Crassa* afford any or not. The impossibility of a Human Dissection proper for such an Inquiry, gives no room either to affirm or deny. But the Contents of the *Intestina Crassa* seem not likely to afford much *Chyle*, and therefore if there be any, 'tis probable they are but very few.

In *Brutes*, if dissected at a reasonable time after feeding, two three or four hours, according to what they have fed upon, they may be seen very tumid and white; and, if wounded, the *Chyle* flows plentifully from them: But, if inspected when the Stomach of the Animal has been any time empty, they appear like *Lymphaticks*, visible indeed, but fill'd with a transparent Liquor. That the *Lacteals* have a Communication from the Cavities of the *Intestines*, is demonstrated by their Contents the *Chyle*. Chyle how soon made. Communication with the Intestines. How their Pores are disposed to receive it, has not yet been discovered: Nor will Microscopes (I am afraid) shew us their passages in the *Villous* Coat of the *Intestines*; nor is there any way yet known to us, whereby we can fill the *Lacteals* from the Cavities of the *Guts* after death: We may be allow'd to imagine, that their entrance into the *Gut* is oblique, not unlike that of the *Ureters*, since neither Wind nor Liquors can pass them from thence. Neither can their passages be altogether like the *Ureters* into

Manner of
it.

the *Bladder*, because we can no more make *Quick-silver* pass from the Trunks of the *Lacteal* Vessels into the *Guts*, than from the *Guts* into them. Since therefore those Pores of the *Lacteals* can only receive any thing in the Living State, we may be allow'd to imagine, the *Peristaltick* Motion of the *Guts* so disposes them, that they then only receive the *Chyle*. This we think may be done by the *Circular* and *Longitudinal* Fibres of the *Intestines*, still applying the Internal Coat of the *Guts* to their Contents, by which means its Pores absorb the *Chyle* from the Excrementitious part.

Mixes
with the
Lympha.

After the *Chyle* is got into the *Lacteals*, it meets with the *Lympha* from the *Arteries* in the *Guts*, before it arrives in the Trunks of the *Lacteals* in the *Mesentery*: Though this Communication between the *Arteries* and the *Lacteals*, may be argued from the *Lacteals* having *Lympha* always in them, when they are not charged with *Chyle*; yet we are beholding to an Experiment for rendring it more certain; for by injecting *Mercury* into the *Mesenterick Arteries*, not only the *Mesenterick Veins* but *Lacteals* also are fill'd with it, and the *Mercury* may be driven on to the *Glands* of the *Mesentery*; of which Mr. *Cowper* has several very neat Preparations from *Human* Bodies, as well as *Quadrupeds*, by him, where the *Lacteals* are thus fill'd.

In

In Dogs there is a large Gland in the middle of the *Mesentery*, which as before observ'd, is call'd the *Pancreas Asellii*, in which most, if not all the *Lacteals* terminate; and thence proceed in fewer but much larger Trunks, to the *Common Receptacle* discover'd by *Pecquet*.

Pancreas Asellii in Dogs and other Brutes only.

But in Men no such Gland being ordinarily found, nor Live Dissections permitted, the *Vasa Lactea Secundi Generis* remain disputable: Though the *Receptacle*, and *Thoracic Duct*, which are as large as in any Animals whatsoever, in proportion to the Magnitude of their Bodies, leave us no room to doubt of the same way of Conveyance, though probably by more and less Channels between the *Glands* and the *Receptacle*, for the Reasons already given.

These *Chyliferous Vessels* opening with their little Mouths into the *Intestines*, receive the prepar'd fluid part of the *Aliment*, and appear at Intervals as it were girt and streightned, and when press'd, do not admit of a Reflux towards the *Intestines*, tho' the Liquor be easily propell'd towards the *Glands*; which argues that there are *Valves* in them, though they are too Minute to have the *Structure* or *Form* of them examin'd.

Valves in the Lacteals.

The *Receptaculum*, or *Cisterna Chyli*, lies near the left *Kidney*, under the *Emulgent* and great *Artery*: Its Capacity and Extent

Receptaculum Chyli.

Progress of
the Chyle.

Tab. II.
Fig. 3.

has been found in Human Bodies, to be much larger than hitherto observ'd. Mr. *Comper* has given us a Figure of a Preparation of it fill'd with *Mercury*, which he has still by him, consisting of three large Trunks, two of which are more than a quarter of an Inch in their Diameters, the third is somewhat less: This Division of it, he thinks, is more requisite in *Human Bodies* than in *Quadrupeds*, on the Account of their Position, the latter being *Horizontal*, the *Chyle* and *Lympha* does more readily pass from one large Receiver into this *Thoracick Duct*; but in Man its Progress being *Perpendicularly* ascending, it seems necessary to divide this Receptacle of *Chyle*, as we see in *Hydrostatical Engines*, in order to take off that resistance which the weight of the *Chyle* would occasion, were it contain'd in one common Receiver.

Oscula.

Its *Exit* is upwards in the *Thorax*, from whence it is call'd the *Ductus Thoracicus*, and it ends in the *Subclavian Vein*. Its Membrane is the same with that of the *Receptaculum*; besides that in the *Thorax*, it seems to be furnish'd with another *Integument* from the *Pleura*. A little more than the third part of its way, or about the middle, it begins to divaricate, but after a Progress of about the breadth of two *Vertebrae*, it unites again, and at last discharges it self with an oblique Insertion into the *Subclavian*,

vian, at which is placed a *Valve*, as there are in divers other places in the Tract of it, which appear, as in the *Lacteals*, plainer by the Nodes, and the denial of the regress of the Liquor when press'd, than from any Demonstration that can be made to the Eye. From hence by the *Subclavian* the *Chyle* is deliver'd to the *Cava*, and so to the Heart, and thence again to all the Body by means of the Arteries.

C H A P. XIII.

Of FERMENTATION *in General, in order to the Better Understanding of ANIMAL FERMENTATIONS, and the Motions of ANIMAL FLUIDS.*

Fermentation, why here treated of.

BEfore I proceed to give any Account of the *Production, Motions and Alterations* of any of the *Fluids* of a HUMAN Body, it will be necessary to premise something concerning FERMENTATION, to which the *Generation, Perfection, and Decay* of ANIMAL Fluids has, by a Consent almost General, been ascrib'd.

Used equivocally by Authors.

FERMENTATION is a Word, that has been so much, and so variously used by Authors, that it is become very *Equivocal*, and the Foundation of many unnecessary, unedifying Disputes, meer *Logomachia*.

Reason of the Method here follow'd.

To obviate therefore any Misapprehensions or vain Contests hereafter, about the Meaning of a Word, which I shall have frequent occasion to use, I am forced to have recourse in this place to *Definitions* and *Divisions*, a Method, though some may think it too *Formal*, and *Scholastick*, indispensably necessary to avoid Cavils, and future Altercations about Words, which while I use them are my own, and which (having here sufficiently taken care to explain what I would

I would have understood by them) I shall not trouble my self to defend, if any one shall hereafter except against my usage of them, or arraign me for Impropriety of Speech, my only care being to be understood, as I mean, which provided for, I leave Elegance and nice Propriety of Terms to those, that study them for other Purposes.

‘ By FERMENTATION *in general*, I *Fermentation*
 ‘ mean such an *Intestine Expansive Motion* of *tion what.*
 ‘ the *Constituent Parts* of *mix’d Bodies*, as
 ‘ tend to a *permanent Alteration* of the *Body*
 ‘ fermented.

By this I exclude all *Effervescencies*, *Ebullitions* or *Intestine Agitations* of Bodies, re- *Effervescencies or*
 puted *Simple* by Violence of *Fire*, or other *Ebullitions*
External Heat, which leave them after cool- *by Fire, no*
 ing, in the same State they were before, *Fermentation.*
 such as the *Boyling* of *Water* or *Milk*, the
Melting of *Metals*, &c. For though in some
 of these, this *Agitation* from *Fire* will pro-
 duce such an *Alteration* in the *Bodies*, as
 will in cooling give the heavier parts leave
 to subside first, and so leave on the upper
 Surface something different, in Appearance,
 from the rest of the *Body*; as in *Milk* the
Skim or *Cream*, and in *Metals* unpurg’d, the
Recrementa or *Dross*. Yet this, in the Case
 of *Milk*, being no more than an *Accelera-*
 tion of that *Separation*, which, without
 this adventitious Force, would naturally
 have

have happen'd; and, in the other, such a one as would never from any Predisposition in the Body have arriv'd; they must both be look'd upon as violent Separations, not properly arising from the Disposition of the mix'd, to which we restrain the Sense of the Word FERMENTATION.

Fermentation promoted by Heat.

However as *Fire*, or any other *Heat* properly modify'd, serves to fuscitate, and promote in Bodies, naturally dispos'd *true Fermentations*, as in *Must*, and other naturally *Fermenting* Liquors, the Heat of the Weather, or any other Analogous Artificial Heat will do, I only exclude those, which are suddenly and violently produc'd by Fire. If any one will have those I have excluded to be *true Fermentations*, I shall not contend with him, provided that as often as I mention *Fermentation* in this Work, he does not understand me of those sorts, it being none of my Intention to dispute what may, or may not, properly be call'd *Fermentation*, but to settle my own Meaning only.

Alterations.

The *Alterations* produced by *Fermentation*, are in general Two: The *Union* of Bodies before distinct, or at least the stricter *Incorporation* of such as, though loosely mix'd, were before not well united; or the manifest *Separation* of such as were before (as to sense at least) united and incorporated, and bore the Face of an uniform Body.

Fermen-

Fermentation produces sometimes *Incorporation* by simple Solution only, wherein the Body, *less* Fluid, is dissolv'd and sustain'd by the *more* Fluid Body; and both together seem to make one Liquor or Substance. In this Case the Fluid sustaining is generally call'd a *Menstruum*, as in *Tinctures* of *Resinous*, *Metallick*, and other Bodies. This is generally Artificial.

Sometimes this *Dissolution* springs from a natural Tendency of these Bodies, to *Ferment* and separate, or at least to cohere more loosely than before, as in the *PUTREFACTION* of *Animal* and *Vegetable* Bodies; which is a degree of this *Solutive Fermentation*, that so intirely dissolves the Union of the Parts, as to render them not only *Fætid*, but incapable of being ever reunited under the same Form, the more Volatile Parts being so disingaged from the rest, as to strike the Organ of Smelling at some distance by their *Effluvia*, as all *Animal* Substances, if left to themselves, will in some short time do, and in some *Morbid* Cases (besides the *Excrements* which do it constantly) some parts of the *Living Animal*, as in *Ulcers*, *Apostemations*, &c. which *Effluvia*, so sent out, are not to be recollected by Art.

A Lesser Degree of this sort of *Fermentation*, which does not so absolutely Enfranchise the Volatile *Fætid* Parts, yet so far

far dissolves the whole mix'd, as to loosen the Coherence of the Parts, and to dispose them towards, or give them a Degree of, Fluidity, which they had not before, without sending out any Offensive Exhalations, is call'd *DIGESTION*, and is that State to which the Aliment is reduced in the *Stomach of Animals*.

Depuratory.

There are other *Fermentations*, which are *DEPURATORY*, and separate something from the mix'd, without destroying the Form of it.

Despumatory with a Strong Effervescence.

This is done two ways, either by sending a Permanent Froth or Scum, as new Wine, Ale, and other Fermented Liquors used for Drink, and is attended with a Strong and Lasting Effervescence, to which if Vent be not given, it bursts the Vessels be they never so strong, and is vulgarly call'd, *Working*, by Artists, *DESPUMATION*. This is either *Spontaneous* or *Natural*, or *Artificial* or *Forc'd*.

Precipitatory with a Gentle Effervescence.

The other is by *PRECIPITATION*, or letting fall some *Recrementitious* Parts, which is usually the Consequence of a Light *Fermentation* without much Tumult, in which some Parts, that before floated separately in the Liquor, unite, and, growing too heavy to be sustain'd in it, fall down to the bottom, leaving the Liquor clearer than before, as the *Lees* and *Tartar* of *Wines*. This is call'd *FRETTING*, and is attended with
a slight

a slight *Spumescence*. This too is sometimes *Spontaneous*, sometimes *Forc'd* by Art.

There is however another sort of *Præ-*^{Coagula-}*cipitatory* FERMENTATION, which is attended with a more immediate and violent Effervescence, than any of the former. This happens not only between those Bodies, which the *Chymists* are pleas'd to call *Acids* and *Alkalies*, (of which more anon) and is instantaneous, follows as soon as the Bodies touch one another, and sometimes before they seem to do so, that is as soon as their *Effluvia* or *Exhalations* meet. These are generally *Saline* Bodies, and when both of them happen to be in *Fluore*, they^{Coagulation from Fluids.} constitute those Liquors which the *Artists* call *Spiritus Macri*, *Saline* or *Lean Spirits*, because they suppose them destitute of *Sulphur* or *Oyl*, at least they appear so to them, being not inflamable, which is their mark of *Sulphur*, however fallacious. To produce these COAGULATORY *Fermentations*, one, at least, of the Bodies must be a Lean Spirit, if both be so, a violent Ebullition is produc'd immediately upon their mixture, which soon ceasing, a COAGULATE Salt compounded, and partaking of both, is let fall to the bottom, as TARTAR VITRIOLATE from *Oyl* of *Vitriol* and *Oyl* of *Tartar*.

If

From Fluid and Solid.

If the *Alkalious* be a dry Body, whether *Testaceous* or *Saline*, the *Acid* let fall upon it raises an immediate and considerable Effervescence, tho' not so great and violent as between the Fluids, yet greater with the *Saline* than the *Testaceous*, and more durable with both, than between the Fluids. When the *Acid* Salt has insinuated it self into the Body of the *Alkali*, the Ebullition ceases, and a mixt or *Neuter* Body is form'd out of them, which manner of concorporating different fermenting Bodies, is, by the *Chymists*, likewise call'd COAGULATION, as the MAGISTERY of *Pearl* from Powder of *Pearl* and *Vinegar*, or any other *Acid*.

Anomalous Fermentations.

There are divers other sorts of FERMENTATION not reducible to any of these Heads, which it wou'd be endless to enumerate, they appearing to be almost as various, and numerous as the several Bodies that will ferment with one another. But the effects of most of these Fermentations ending with the Act, viz. neither producing any *Despumation*, *Precipitation*, *Coagulation*, or any other separation, or other permanent Alteration whatsoever, other than simple mixture wou'd do, it may be sufficient to mention the principal accidents that attend several of them during the Activity of their *Ferments*. These may

may be call'd *ANOMALOUS FERMENTS*, since they are not to be brought under any certain *Classis*, or Rules.

Among these *ANOMALOUS* kinds may be reckon'd that *Fermentation*, which ^{In Bread.} is rais'd in *Dough* by *Yeast*, or *Leven*: In which, altho' there be a notable Intumescence or Swelling of the *Mass*, yet it produces no other considerable alteration in the Property. Neither is that lasting, unless the *Mass* be bak'd in an Oven, or otherwise harden'd by the Fire, which hinders the Parts from subsiding again, as (left to themselves) they naturally wou'd do. *Bread* is indeed accounted the more *Wholsome*, and easie of *Digestion* for this *Fermentation*, whence some wou'd infer an essential alteration in the Qualities of the *Mass*. But that is a mistake. For that Lightness and Easiness of Digestion is altogether owing to the *Rarity* of the *Texture* introduc'd by the *Leven* or *Ferment*, assisted and promoted by the Heat, whence the Parts touching one another in fewer and smaller Surfaces, become more easily separable in the *Stomach*.

Of the same kind is the *Fermentation* of some *Pharmacopæal Preparations* made of a mixture of *Ingredients*, some *Aromatick* and ^{Venice Treacle, &c.} *Volatile*, others *Viscous*, whose Intumescence arising from a *Tendency* of the *Volatile Parts* to escape thro' the *Viscous*, is not attended
H with

with any separation, or other manifest Alteration of the Qualities of the Mixture, which after the Fermentation is over (being well agitated, as such Preparations usually are) bear one uniform Face, as other *Officinal* Unfermented Electuaries do. Of this sort are *Venice Treacle*, the *Philonia*, &c. made with Honey or other viscous Fermentative Substances. These *Fermentations* being sluggish, tho' the Intumescence be great, produce no very notable degree of Heat.

Flame
kindled by
Fermen-
tation.

There are other *Anomalous* FERMENTATIONS, which tend neither to the Perfection nor Union of the Bodies Fermenting, yet are attended with a prodigious Ebullition, and most intense Heat, even to ACTUAL INFLAMMATION between some of 'em, as between strong *Aqua Fortis*, or Spirit of Nitre, and Rectified Oyl of Turpentine, or Distilled Oyl of Cloves, &c. which end in the Destruction of the Subject, leaving nothing but a *Calx* behind. An ACTUAL FLAME, or Consuming Fire, is sometimes likewise produc'd by *Occult* or *Smother'd Fermentations*, as Country-men to their Loss, Experience, when their new Hay is made up into great Cocks, or Rikes, before it be well dried.

Intense
Heat
without
Ebullition.

An INTENSE HEAT may likewise be produc'd by a *Fermentation* without any very visible Effervescence, as when Oyl of Vitriol is mixt with Water, which will heat

a Glafs or Metalline Cup fo as not to be endured by the naked Hand, yet without any Ebullition. The fame, or indeed much greater, Heat it produces pour'd upon *Spirit of Wine* (with the fame appearance, except a change in Colour) and upon *Vinegar*, and moft of the *Acids* of the *Lower Clafs*.

To folve the great variety of different Appearances, arifing from the feveral forts of FERMENTATIONS, *Hypotheſes* almoſt innumerable have been fram'd, which their Authors have endeavour'd to accommodate to the many surprizing *Phænomena*, which this one part alone of Natural Mechanifm furniſhes.

*Various
Hypotheſes*

But with how little Succeſs they have generally attempted theſe Difficulties, as it may perhaps be thought Arrogance in me to ſay of the Labours of Men ſo eminent and ſo much more able, than my ſelf, ſo it muſt be Ignorance in me unpardonable not to know, ſince by the nature of my Undertaking I am oblig'd to offer my own Senſe concerning 'em (unleſs I cou'd acquieſce intirely in any thing already laid down) tho' perhaps what I ſhall offer may only add to the heap of exploded Opinions.

*Unsatisfac-
tory.*

The narrow limits to which I am in this Place circumscrib'd, favour my Inclination (and perhaps my Weakneſs too) not to enter

ter the Lifts too far againſt Great Men, to whoſe Inſtructions I readily and cheerfully ſubmit as far, as my yet greater Deference to Truth will permit, & *quouſq; libere Philoſophantem decet*. I am not here ſolemnly, or formally laying down a compleat *Theory* of *Fermentation*; nor oblig'd to refute ev'ry *Hypotheſis*, which I may think to be inſufficient, nor even ſo much as to account for all thoſe different *Phænomena*, which I have already mention'd: But for thoſe only, which I believe to have a ſhare in the ANIMAL OECONOMY, and eſpecially in thoſe Parts of it, of which I ſhall be oblig'd to ſpeak in treating of thoſe *Problems*, which to me ſeem neceſſary to this Work. Herein I ſhall avoid all unneceſſary Offence either to Authors Living, or the juſt Admirers of thoſe, that are Dead; and therefore ſhall ſpeak to ſuch Opinions only, as ſeem to be moſt accepted, without deſcending to Arraign Authors or Abettors by particular Quotations, which are uſually offenſive to the Living, when contraverted, and injurious to the Dead, who can't explain themſelves any farther, if miſtaken.

Two General Hypotheſes, Corpſcularian and Chymical. Common Conſent of *Physicians* and *Naturaliſts* has, in a manner, reduc'd the General *Theory* of *Fermentation* to two HYPOTHESES; one deſcended from the Doctrines of *Democritus*, *Epicurus*, and their later

later Followers; the other from *Paracelsus*, *Helmont*, and the Modern *Chymists*.

The first pretend to solve all the Difficulties occurring in this part (which is none of the least, or most intelligible) of Physical Knowledge by the Concourse, and Agreement or Disagreement of *Atoms*, (which according to them are the *Seeds* of all *Natural Bodies*, and *Principles* of all *Physical Action*) floating in the *Atmosphere*, and which by their fortuitous Concurrence either unite and settle quietly, or by their Contranitency and Reluctance occasion all these Natural Bustles, of which I have been speaking, which the Diversity, Contrariety, and Infinity of these *Seeds*, or *Principles*, they think make not hard to be conceiv'd.

Epicure-
an or A-
tomist's
Account.

The *Cartesian* Notion (which most of the *French Philosophers* embrace in this Point at least) is a Refinement upon the foregoing, and establishes a SUBTIL MATTER or *Æther*, which having a constant *Rapid Motion*, pervades the Pores of all Bodies *Fluid* or *Solid*, *Diaphanous*, or *Opake*, and, while the Pores of the pervaded Bodies keep their wonted Station and Disposition, the *Æther* passes swiftly, but quietly thro' 'em without ruffling or discomposing the Body, however Fluid and easily disturb'd. But if by Mixture or other accidental means the Course of these Pores

be so interrupted and broken, as to create any Obstacle to the Passage of the *Subtil Matter*, it raises Commotions *gentle*, or *violent*, till it has open'd a *free* Passage for it self, or has rent the Body to Pieces. This Doctrine they Illustrate by the celebrated Instance of the *Glass Drops*, which by breaking off the Tip are shatter'd into a Million of Pieces in an instant.

Corpus-
cularian
too Gene-
ral but not
Absurd.

Tho' neither of these Opinions contain any thing absurd, or that can be demonstrated to be untrue, yet without offence to Modesty I may say they are unsatisfactory, as being too *general*, and *abstracted*, even so far as to be alike applicable to every Phenomenon and in equal Degree, which will not answer particular Circumstances. For if I be ask'd, why *Yeast* mixt with *Ale*, or *Dough*, makes 'em Swell or Ferment; according to the *Atomist's Hypothesis*, I must answer, that the Intumescence springs from the jarring or disagreement of *Atomes*, that can't lie quietly together: According to the *Cartesian*, that the continuity of the Pores being by this mixture broken, the Tumult is rais'd by the *Aether*, which is seeking or forcing a new Passage. But what is the *disagreement* of the *Atomes*, or *interruption* of the Pores, and wherein it consists, and why the *Fermentation* is in one case *Hasty*, *Violent*, and *Short*, in another *Slow*, *Languid*, and *Durable*, are Questions

sions that these *Abstracted Theories* make no answer to. And when those, that Philosophize from 'em, undertake to do it, their Answers are generally such as have no dependance upon their *Theories*, or so *Precarious*, or *Arbitrary*, as a judicious Inquirer can't acquiesce in, and he might as well take up with the old *Peripatetic* Juggle of *Sympathy* and *Antipathy*, which he might deal about and distribute, as in his Discretion he shou'd think fit.

By the great number and variety of *Experiments* which the *Laboratory* and *Furnace* supply, the *Chymists*, or as they affect to call themselves the *Philosophers* by *Fire*, seem better furnish'd for an Argument of this kind than any others. But howsoever it has fallen out, whether through the *Arrogance* or affected *Obscurity* of some, and the slender *Literature* of others, which have render'd them unfit for a free and rational *Philosophy*. They have been no happier than the rest, though more conceited, and have generally reason'd about the *Phænomena*, which they saw, rather like servile *Operators*, than great minded *Philosophizers*.

The *ESSENCES* of *Paracelsus*, the *ARCHÆUS*, *GAS*, *BLAS*, &c. of *Van Helmont*, notwithstanding all their Boasts, give us as little Light into the Nature of Things, as the occult Qualities of *Aristotle*, and in spite of their barbarous

Chymical
not more
satisfactory

Insufficiency
of *Essences*,
Archæus,
Gas, *Blas*,
&c.

Cant, which as a *Veil* they wou'd throw over their Ignorance, and their affected Mysteries, by which they wou'd pass for profoundly Knowing and Reserv'd; we may see their real defects, and that they grop'd about as much in the Dark, as others whom they superciliously overlook'd.

Narrow
and Absurd

The SALT SULPHUR and MERCURY of some, and the *five Principles* of others, which are the same with the former, with the addition of PHLEGM, and CAPUT MORTUUM only, by themselves confess'd to be unactive, are too narrow a Bottom, to build a solid and substantial *Philosophy* upon, as the Honourable Mr. Boyle has sufficiently demonstrated in his *Sceptical Chymist*. Much less then are we to hope for *universal Solutions* of Problems of this Nature from those that a-bridge them yet farther, and resolve all into ACID and ALKALI.

The wretched Shifts which these *Pyrotechnites* make, and the hasty Conclusions they draw from a few ill understood Experiments, are sufficient to give a Man a Surfeit of such awkward *Philosophy*.

But were these Men qualify'd with sufficient Learning and a liberal Education, yet were it impossible for them, upon *their Principles*, to arrive at any considerable degree of *Natural Knowledge*, or to know any thing more than their Eyes wou'd inform

inform them of, without any use of Brains.

For taking their Principles in the largest Extent including their *Spirit* (or *Mercury*) *Salt*, *Sulphur*, *Water* and *Earth*, as they call their *Phlegm* and *Caput Mortuum*. It is impossible for any Man to make any Progress in real Knowledge upon them. Nor is the multitude of *Phanomena* which the *Laboratories* of such Men produce any Argument against what is here advanc'd : Nor any proof of their Skill, any more than a Blind Man's throwing Stones, and hitting several People in a Croud, is an Argument of the exactness of his Aim. They have indeed nam'd several sorts of Bodies, which they wou'd have not only to be *Generical*, but the *Real* and *Universal* Materials of all other Bodies. If they were so, wou'd the certainty of that inform us how, and in what manner and proportion they were mixt, and acted upon one another, so as to produce the vast variety of *Beings*, *Animate* and *In-animate*, and their several Properties which offer themselves to our Consideration? No! they are so far from that, that those Bodies, which they call *Principles*, and which to deserve that Name shou'd be the most *Simple* in *Nature*, are so variously *compounded* and *de-compounded* even to Indefinity, that they who use the terms in *Common* have not one
common

common Meaning, but are forc'd when they Talk or Write to one another of those Matters, to allow a vast Latitude of Construction, and perhaps it is not once in ten times when they Discourse of their Principles, especially if they apply them to the Solutions of particular *Phænomena*, that the *Speaker* and the *Hearer* understand their Terms strictly alike, how much soever they may seem agreed.

*Terms
Equivocal.*

For Example, the *Chymists* agree in making *Sulphur* the Ground and Cause of *Smell* and *Colour*: A Notion founded upon a slight Experience, that some *Vegetable* (*Essential* as they affect to call them) *Oyls* carry the *Smell*, and will sometimes upon Mixture with other Things impart the Colour likewise of the Plant or Flower from which they were drawn, yet they have never been able to settle their *Idea* of *Sulphur*, or to come to any generally allow'd Determination, what Bodies they comprehend under that Name, and what they Exclude, so that they have assign'd Properties and Functions to they don't know what.

*Solutions
Evasive.*

However upon this, and other Terms altogether as *EQUIVOCAL* and uncertain, they found *all* their *Theory*, which is in all their Writings arbitrary and precarious. Ask any of these *Philosophers* by *Fire* to account for the *Colour* and *Smell* of
a *Rose*,

a *Rose*, he will tell you that they spring from the *Sulphur*; and ask him why sometimes the *Smell* is more vigorous or languid than at others, and he will answer that it comes from the *Exaltation* or *Depression* of the *Sulphur*: But ask him what *Sulphur* in general is, and you shall either have no Answer at all to it, or that it is an *unctuous inflammable Substance*, by which Answer you are never the nearer the end of your Question: For if you demand further how *Unctuosy* and *Inflammability* contribute to the Production of *Colour* or *Odour*, he is at the end of his Line, and you must rest contented with his Word, *that they do*, without any further inquiry into the *Modus*. If at any time you produce them any very high colour'd or odorous Body, which by all the Torture of their Art, will not afford any *unctuous inflammable Substance*, they will however positively tell you, that it is there conceal'd in the *Concrete*, tho' they are not able to Extract it, and rather blame, and condemn their Art than their own Reasoning: Neither will they allow it to be any Argument against them, that a great number of Bodies, which have the *Characteristick Mark* of *Sulphur* in the highest degree, have very little *Colour*, and no *Scent*, as *Oyl of Olives*, and abundance of others, which are Transparent, and pretty near Limpid, and will burn till they are quite
con-

consum'd, without affording any considerable *Smell*. Even that particular Body, from which they denominate this pretended *Principle*, is not it self an unctuous Substance, nor does it upon the *Analysis* yield any. That which the *Chymists* call *Oyl* of *Sulphur* is an Acid Liquor, neither *Unctuous* nor *Inflammable*; so arbitrary and unaccurate are they in their *Terms*. Besides this there are multitudes of other *Concretes*, which they call *Sulphureous*, that do not answer both their *Tests*, and many neither of 'em, which it wou'd be endless, and besides our Purpose to name.

Principles of the
Chymists
equally Ex-
ceptionable.

I have not chosen out this, as more liable to Exception than the rest: Any of those, which they call the *Active Principles*, wou'd have afforded me as ample a Field. For there is not one of them under which they do not comprehend a thousand Bodies of different Natures, of which many are absolutely Repugnant to, and Destructive of one another, as manifestly appears from the mixture of different *Salts*, in which both *Acids* and *Alkalies* lose their separate Properties, and are confounded in a Substance, which they have been pleas'd to call *Neuter*, for want of Skill to range, and class them. Tho' abundance of that kind be of Natures own Production, as *Sal Armoniack*, which is both *Natural* and *Artificial*.

The

The same may be said of their MERCURY OF SPIRIT, by which they understand every thing that is *Volatile*: How contrary soever to one another the several *Species* may be, as *Spirit of Hartshorn*, and *Nitre*, and innumerable others, which mixt together, produce the most violent Effervescences, that we know, and in the end destroy the distinguishing Properties of one another.

Notwithstanding this narrowness of the *Chymical Principles* in their largest Extent, there have some arisen, who wou'd reduce them yet to straiter Limits, and solve all *Phanomena* by *Acids* and *Alcalies*, under which they pretend to Class all Bodies whatsoever, *Mineral*, *Vegetable*, or *Animal*. This *Hypothesis* has all the Imperfections of the former, and thousands more. But not to give our selves much trouble about it, it has one *Fundamental Flaw*, which like a *Constitution-Distemper*, will not suffer it to be long-liv'd, which is, that what *Acid* is, or what *Alkali* none of its Favourers have ever yet been strictly able to Define, but have been forc'd to shuffle the same Body from one Class to another, as occasion requir'd. Thus *Vinegar*, when pour'd upon any *Testaceous* Body, is reckon'd by them an *Acid*, because it raises an Effervescence. But when *Oyl of Vitriol* is pour'd upon it, and an insufferable Heat is thereby

Include under the same Principle Things naturally Opposite and Destructive of each other.

Crampt yet more by the Hypothesis of Acid and Alkali.

Those Terms Vague, and Indefinite.

by produc'd, it is according to them an *Alkali*, to preserve their *Hypothesis*, which supposes a necessity of an *Acid* and *Alkali* in all *Fermentations*.

Calculated
(but un-
skilfully) to
solve the
Pheno-
mena of
Fermen-
tation.

This *Hypothesis* is the Product of the *Laboratory*, and calculated for this one *Phænomenon* of *Fermentation* only, and as it is the Off-spring of weak unskilful Parents, so is it infirm and insufficient for that single End, of which its *Favourers* have been made so often sensible, that many of them, when they are press'd to define what they mean by the Terms, say, that an *ACID* is that which will ferment with an *Alkali*; and an *ALCALI*, that which will ferment with an *Acid*. Those, that have had the Address to avoid being so far press'd, are however as arbitrary in their Accounts, and call this an *Acid*, and that an *Alkali*, just as the occasion requires, without assigning any Reason why they Range them under those Heads, but that in their Opinion, they must be both there, otherwise there cou'd be no *Fermentation* and he that will be so gracious as to allow that, may in many Cases make, which he pleases, the *Acid* or the *Alkali*, without any Opposition from them.

Crept too
far into
Phylick.

It had scarce been worth while to have taken so much notice of these absurd Opinions, had they not crept so far into *Phylick*, as to pervert the Understandings, and
debauch

debauch the Reasonings, of many who otherwise might have employ'd their Talents to good purpose, and given opportunity to Impudent *Quacks* and *Empericks* to prate about things they did not understand, and banter the People with *Cant* without Reason.

There is no doubt but *Chymistry* affords very great additions to, and improvements of the ART of HEALING and the THEORY of PHYSICK, and that those who are Ingenuously and Honestly Conversant in the *Laboratory*, have opportunities of making many Luciferous Observations, when their Thoughts are not cramp'd and confin'd to the Furnace, which has sent into the World so many Scandalous *Empericks*, who trusting to a few prestigious Tricks, which that has taught them, have impos'd upon the less considering Part of Mankind, who (easily believing, that they who cou'd do things to them so surprizing, were Masters of all the Secrets they boasted of) have to their Peril confided in 'em upon such Reasonings. Tho' they might as well have attempted to account for all the *Motions* of a *Clock*, by *Acid* and *Alkali*, or *Salt*, *Sulphur* and *Mercury*, as what they pretended to.

Chymistry, rightly applied, of great use in Physick.

The

*Oversight
of the Chy-
mists in
the first
Settlement
of the
Number
of their
Princi-
ples.*

The Founders of the *Chymical Philosophy* were certainly very unwary in circumscribing themselves to such *Narrow Principles*. For any Reason that appears to the contrary they might have allow'd themselves *five Hundred* as well as *Five*, by which means they wou'd have avoided those miserable Shifts they have been put to, to save the appearance of their Principles: Nor need they have rank'd Bodies directly opposite, and destructive of one another under the same Class, as they are frequently forc'd to do. When we consider what a variety of *Hypostatical Principles* there are, which their Simplicity (as to Sense and our *Analysis*) may make warrantably pass for *Second* or *Subaltern Principles*, (higher than which, a *Chymist* cannot Mount, because his *Laboratory* cannot inform him farther) it is matter of just Wonder why they shou'd restrain themselves, when they might have taken a warrantable Liberty, and been justify'd by the Productions of their *Furnaces*. They cou'd not but know, that many of those Bodies, which they call *Mercury* or *Spirit*, were as essentially distinguish'd from one another, and by as indelible *Characters*, as SULPHUR is from SALT, or Salt from MERCURY, and so on. Had they therefore enlarg'd the number of their Principles, and not requir'd them all or any stat-ed Number of 'em in every Body, they had

had taken away from their Opposers innumerable occasions of Triumph, which upon the present Foot are unavoidable.

That *Principle* alone, which they call *MERCURY* or *Spirit*, includes divers *Species* of Bodies, which nothing but the arbitrary Humour of such *Chymists* cou'd reconcile to one Head. The volatile *Acid*, and *Alkalious Spirits* are not only different, but opposite: The *Vinous inflammable Spirit* is specifically different from either of them, and there is another *Vegetable Spirit*, which has not yet receiv'd a *Classick* Name, that differs as much from them all, and is neither manifestly *Acid*, *Alkalious*, *Vinous* nor *Inflammable*, and yet is a very *Brisk*, *Active Spirit*, will Ferment very durably with *Spirit* of *Nitre*, yet not so much as turn the Colour of *Syrup* of *Violets* either way. I mean that sort of *Spirit*, which is drawn from *Scurvy-Grass*, *Horse-Radish*, and all that *Tribe* of *Biting Plants*: And there may be a great many more as specifically distinct, if their Properties were nicely inquir'd into, which this unaccurate way of *Classing* has confounded in the General *Mass*. Even among the very manifest *Acids* themselves, and the strongest of them, we find very considerable Differences, which seem not to be owing to their *Acidity*, but to some other Qualities yet no otherwise discover'd, than by the Properties

which

Their Classes contain Bodies of differing and repugnant Qualities under the same Denomination.

which flow from them: Thus *Aqua Fortis* will dissolve *Silver*, and not *Gold*, and *Aqua Regia* will dissolve *Gold*, yet not touch *Silver*: And *Oyl of Vitriol*, which seems to be as high an *Acid* as either of them, will not act upon either, but will dissolve *Iron* more readily than they. This evidently shews that those Qualities, which the *Chymists* ordinarily assign as the *Distinguishing* and *Characteristick Marks*, do not sufficiently discover their Properties and natural Relations to one another, and that consequently a more accurate Division is necessary to make 'em so useful, as the *Chymists* wou'd pretend, and without any vain Exaggeration they might really be, if consider'd as they ought.

Salts not
distinctly
enough, and
Class'd.

The same may be said of their *SALTS*, under which Head they Class all sorts of Bodies that are *Sapid*, and *Soluble in Water*, whatsoever Contrariety or Repugnancy they may have to one another in their own Natures. These perhaps are the most reasonably class'd of all their pretended Principles, notwithstanding the variety and difference that is to be found among them, because they answer the Generical *Trial* and *Taste* more uniformly than the rest of their *Active Principles*. But when they come to make it a *Principle* or *Producer* of many of those Qualities, which they pretend to fetch from it, they argue as absurdly,

ly, as from any other part of their *Philosophical Romance*.

Their other two (P H L E G M and C A P U T M O R T U U M) which are by all of them reckon'd as unactive, and therefore by many thrown out of the List of *Principles*, are liable to as many Exceptions in proportion to the Use they make of them.

But it is not proper to spin out this Digression any farther. They that believe what I have already said against their *Principles* to be reasonable, will be satisfy'd with that.

They that do not, will require more Conviction than my Design gives me room for here, and must have Recourse to those Authors that Treat expressly on this Subject, and will undoubtedly, if they be unprejudic'd, find it in that Elaborate Piece of the Learned and Ingenious Mr. Boyle, call'd the *Sceptical Chymist*.

Phlegm
and Caput
Mortuum, ob-
noxious to
the same
Excepti-
ons.

Vide,
Sceptical
Chymist
of Mr.
Boyle.

That the Resolution of Bodies into their *Visible Elements*, or the most *Simple Parts*, that hitherto Art has suggested any way to find, is of great Use to *Physicians*, is past Controversy, as well from the constant Use which Physicians both in their *Theory* and *Practice* make of such Bodies, as from the necessity they have of Recourse to such Things as they can upon occasion produce and apply, with some knowledge of their Operations and Effects. For those Bodies be not so absolutely Simple as

Chymical
as Subal-
tern or
second
Princi-
ples of
Great
Use in all
Parts of
Natural
Philoso-
phy, espe-
cially
Physick.

in *Natural Philosophy*, to deserve the Name of *First Principles*: Yet since they have such constant, and regular Effects, as we are not able to prevent without first corrupting them, and are the *Ultimate Results* of the minutest *Analysis* we have been hitherto able to make, they may very well be reason'd upon as *Subaltern* or *Second Principles*, which are the Instruments that *Physicians* must use, who are not able to govern *Matter* and *Form*, or *Matter* and *Motion*, abstractedly consider'd; which tho' they may afford pleasing *Speculations*, and perhaps true ones too, are not reducible to *Practice* and *Experiment*, and therefore of no real Benefit to Mankind, without the Intervention of some such intermediate Principles as these.

Necessity
of a more
Accurate
Disposition
of Natural
Bodies
into yet
Nicer
Classes.

It wou'd therefore be a very great Service to all sorts of *Mechanical Operations*, to redeem these *Second Principles* from that Obscurity and Perplexity into which the *Chymical Philosophers* have either thro' want of Judgment or Ingenuity, plung'd them: And perhaps by Classing these Bodies in appearance Simple in a clear Method, according to their several distinguishing Qualities, and Effects, many Doubts now very perplexing might be resolv'd: And many Ends answer'd, which now remain as *Desiderata*, as well in all other *Arts*, as in *Medicine*, which we hope will be sufficient to induce those who have
Means

Means and Capacity to contribute their Endeavours to so necessary a Work for the relief of Human Infirmities ; in which they will have the advantage to find the Field less pre-occupy'd, than in any other part of Natural Knowledge, and room enough for the Industry and Improvements of Ages yet to come.

But to return to the immediate Subject of this Chapter, *Fermentation*, which is (notwithstanding the Endeavours of some to fling it out) one of the main Wheels of *Animal Oeconomy*; I have endeavour'd to shew that the CORPUSCULARIAN HYPOTHESIS is too General, and abstracted to account satisfactorily for the *Phænomena* of particular Fermentations; however true it may be, that what is laid down in it is the Ground-work of all, and is no better a Direction in *Practice*, than it wou'd be to a Traveller, to tell him that *Rhoan* was a City in *France*. If he that was to go thither, had no better means of inquiring his way, 'tis probable he wou'd never get thither.

Chymistry, like a particular *Map*, seems to promise a more certain Direction in some Parts of *Physical Knowledge*. But (as it has been manag'd) like an ill *Map*, it points us only to some few conspicuous Parts without any measur'd *Distances* or *Degrees* of *Longitude* and *Latitude* to guide us certainly

Corpuscularian Hypothesis, how too General and Abstracted.

Chymical wherein Defective.

ly in our Way, and leaves us to hunt out the Place we wou'd Arrive at, whether to stumble fortuitously upon it, or by immethodical Inquiries of I don't know whom, or how to find it out.

Great Obligations to
Ingenuous Chymists.

We are indeed oblig'd to those Ingenuous Operators in *Chymistry*, who without Bantering us with false Reasonings, communicate to us what their Labours and Inquiries have made certain to them, and like those honest Countrymen, who without *Clock*, *Watch*, or *Dyal*, look up to the Sun, and tell us, as near as they can guess, sincerely what time of Day it is, which tho' we cannot depend upon to a Minute, will however serve us to Proportion our Speed by, if we know the Length of our Way. To the Hints, which such *Chymists* afford, we owe all the Improvements, that have been made in the *Theory* of *Animal Fluids*, and tho' they are not often to be met with, one Chymist, of such Ingenuity and Probity as Mr. *Moult*, makes Reparation for ten *Charlatans*, with all their vain affected *Mysteries* and mischievous *Arcana*.

Having premis'd thus much concerning *Fermentation*, in order to remove such Prejudices as have been entertain'd concerning it, and to shew the necessity of a more particular and less exceptionable *Rationale* of this surprizing Method, by which Nature works in the Production of most of her
con-

considerable *Animal* and *Vegetable* Phænomena, it will be necessary for me to offer my own Thoughts, that when in resolving many Problems of the Animal Oeconomy I reject the Solutions as not agreeing with verity of Fact, and reality of Circumstances, I may not leave the Reader without something (in my own Opinion at least) applicable to both, and sufficient for the Purposes to which I use 'em; of which I must leave the intelligent Reader to judge, and therefore bespeak his Candour.

And here it will not be improper to remind him, that, as I have no where denied the *Existence* of the *Æther* of the *Corpuscularians*, nor its Activity in the Production of this particular great Phænomenon *Fermentation*, but have thought their Solutions too slightly circumstantiated to give any great Satisfaction or Light into a Part of Nature so abstruse, and to clear up all Doubts concerning it: So on the other hand I must frankly avow that many Circumstances of this Phænomenon alone plead strongly for the Existence of some such *Subtil* Bodies, which permeate all others with the utmost degree of Celerity and Rapidity imaginable, otherwise it wou'd be hard to account for that violent Motion, which is instantaneously produc'd between Bodies, that were (to appearance at least) before quiescent, especially

Existence
of the *Æther*
thought
probable
by the Au-
thor.

pecially if *Nil dat quod non habet*, be in this Case a true Axiom.

Vain Con-
fidence of
the Chy-
mists in
Acid and
Alkali.

The *Chymists* on the other side exult, and think the Power and Contrariety of their *Acids* and *Alkalies* sufficiently demonstrated; since from the commixture of those opposite Bodies, that they range under these Heads, most of those sudden and violent Effervescences arise. Neither cou'd this *Fermentative* Opposition be denied to 'em, if they were contented to lay no more upon it, then it wou'd fairly bear. But, when they pretend their *Tria Prima*, their *Salt*, *Sulphur*, and *Mercury*, or even with the other two, *Water* and *Earth* added, to be the HYPOSTATICAL Principles of all Bodies, and the sole Efficient Causes of all the Properties and Accidents, that belong to, or befall 'em, they give all those, that are Ingenuously studious of promoting real and true Natural Knowledge, just Provocation to refute and expose 'em. For to adjust all manner of *Phanomena* to the largest of their *Hypotheses* we must confound all our Ideas of Natural Bodies, and range 'em sometimes under one Principle, sometimes under another directly opposite; as for Example, When the *Spirit* or *Phlegm* of *Vitriol* ferments with *Oyl* or *Salt* of *Tartar*, or *Spirit* or *Salt* of *Hartshorn*, a HYPOSTATICAL *Chymist* will roundly call the *Spirit* of *Vitriol* an *Acid*, and the other

Not al-
ways to be
found in
Ferment-
ing Bo-
dies.

other Bodies *Alkalies*. But what will he call the same *Spirit of Vitriol*, when it Ferments with *Oyl of Vitriol*, another *Acid*, and not only so, but drawn from the same Body, by the same Operation, without any different Circumstance necessary to produce it, but a little more Time, and Fire? The same may be said of all their very high *Acids*, which will Ferment with a lower Class, tho' they differ, only *Secundum Magis & Minus*, no more than in Degree.

Since therefore *Fermentations*, and those not a few, may be rais'd without the necessary Colluctation of an *Acid* and an *Alkaly*, an Ingenuous *Chymist* wou'd lay 'em aside, as no true *Principles of Fermentation*, and consider 'em only as *Instruments*, which, whenever certainly both present, highly promoted that Operation, in which all Rational Inquiries must go along with him or reject indubitable Fact. But then he must go out of the Sphere of his own Activity, his Laboratory for it, to which the working Chymists have been generally so bigotted (upon the score of some Searches, which they have usually laid more to Heart, than the Improvement of sound Philosophy) that they have generally neglected all that was to be learnt without the Furnace, as not conducing to their End, and too ignoble for their Ambition or Avarice.

To be considered as Instruments of Fermentation only, and Accidental.

But

*As such, not
repugnant
to the Cor-
pusculari-
an Hy-
pothesis.*

*Defect of
the Cor-
pusculari-
an Hypo-
thesis of
Fermen-
tation
without
'em.*

*Absurdity
of the Hy-
postatical*

*Receiv'd
and recon-
cil'd in
some Ca-
ses by the
Chymi-
co-Cor-
pusculari-
an, or Mr.
Boyle's
Hypo-
thesis.*

But whether *Chymists* will be so conde-
scending, or not, the *Corpuscularian* Princi-
ples are not so Strait-lac'd, but that they
may to very good Use receive the *Chymical*
Acid, and *Alkali* (so as not to make 'em
Hypostatical, or the sole Constituent Parts
of all Bodies) and employ 'em with good
Success in the Solution of many Natural
Phænomena, concerning which, they have
been used to reason too abstractedly and
remotely to draw any very useful Practical
Inferences from. Thus tho' a *Corpuscula-
rian* sees a violent Fermentation rais'd be-
tween two Bodies, and imputes it to some
Obstruction thereby created to his Permeat-
ing *Ether*, yet he's at a Loss for the reason
of this Obstruction, and why rather be-
tween the two Bodies before him, than some
others that seem more likely to produce it.

The *Hypostatical Chymist*, who from Ex-
perience knows, that those Bodies do con-
stantly and regularly exhibit those appear-
ances, is as much at Loss why, but (without
assigning any thing Mechanically capable
of exciting such Motions) absurdly feigns
Natural Inclinations and *Aversions* in *Inani-
mate* Bodies. But the *Corpuscularian Chy-
mist* who applies the *Mechanical* Principles
to the Phænomena of the *Laboratory*, avoids
both these Difficulties, as well immediate
and particular, as remote and general, as
the Honourable Mr. *Boyle* has very happily
expe-

experienc'd, particularly on this Subject of *Fermentation*, by supposing the *Acid* to be *Sharp* or *Pointed* Bodies, like little Blades of Knives, and the *Alkalious* to be *Porous*, like small Sheaths into which the *Acids* are forcibly driven by the rapid Stream of *Æther* constantly pervading both Bodies, tho' not in equal Measure, but in proportion to their Number, and Capacity of their respective Pores, which Agitation causes first a very furious Ebullition till the Pores of the Mixt are dispos'd regularly for the Passage of the *Æther*, and next a *Precipitation* or Subsidence of those Parts, which being ingag'd mutually, or impacted into each other, grow specifically heavier, than the Fluids which before sustain'd 'em, and therefore after their *Coalition*, or (as the *Chymists* term it) *COAGULATION*, sink down and leave a free Passage to the *Æther* thro' the mixt Liquor, which thenceforward remains to outward Appearance one uniform, homogeneous Fluid, where the *Coagulation* does not unite the whole Substance. Or otherwise the Parts of either Body are so minutely broken or mixt, as to Swim quietly together under one Form without *Precipitation*, and are to appearance Uniform, tho' not Simple.

But this way of Solution by a mixt *Chy-*
mico-Corpuscularian Hypothesis, however In-
 genuous and Rational, tho' it seems justly

*Which com-
 prehends
 not all
 kinds of
 Fermen-
 to tation.*

Active
Principles
of the Chy-
mists not
so ex sua
natura.

to take Place in those *hasty Fermentations*, which are produc'd by the mixture of manifest *Acids* and *Alkalies*, leaves us yet some room to doubt its Sufficiency, when applied to some other kinds of *Fermentation*, where the concurrence of an *Acid* and *Alkali* are not so evident. For tho' the violence of the Motion, and the suddenness of the Expansion in such *Fermentations* (as we have been just now treating of) seem to require the Activity of the *Aether*, (or some other Body of equally rapid Motion, and general Influence, which will as little fall under the Examination of our Senses) to give Life to the *Acid* and *Alkali*, or other Principles of the *Chymists*, which whatever they dream of, or feign of their Activity, are of themselves as Sluggish and Unactive, as those they call so; and even their most visibly *Active* Principle *Salt* is perfectly dead, unless invigorated and enliven'd by Solution in some of that *Phlegm*, which they so much despise: Yet there are some Fermentations to which it cannot be prov'd, that both these *Chymical* Principles concur, and some to which perhaps neither of 'em do; and whose leisurely, unprovok'd, gentle Intumescence and Despumation seems not to need, much less to have, any such violent forcible Agitation, as the Interruption of the Course of the *Aether* is presumed to be attended with.

Of

Of this leisurely gentle kind, are all those, ^{Fermentations divided into Natural, or Spontaneous, Artificial or Violent} which Nature uses towards the Perfection of those purposes wherein she uses this way of Operation, as in the *Maturation of Fruits*, and pure *Natural Liquors* made of their unmixt Juices, &c. which I shall therefore call *Natural FERMENTATIONS*, (according to a distinction already laid down) and those, that shall proceed in a manner *Analogous* to these, *Spontaneous*, although they may happen to have been first produc'd, or afterwards promoted by Art, unless it be by the manifest Colluctance of *Acids* and *Alkalies*, all which I shall call *Artificial* or *Violent*, and have already accounted for in general, by the *Chymico-Corpuscularian Hypothesis* of that Noble Philosopher Mr. Boyle, to whom all the Curious are eternally indebted.

Under the *Artificial* or *Violent FERMENTATIONS* may be comprehended all those, that spring from the mutual Action of a manifest *Acid* and *Alkali*, and some others, which (tho' the *Alkalious* Nature of that which is suppos'd to be the passive or less active Body might very well be contested) I range with 'em, because of the share which high *Acids* have in such *Fermentations*, and that they are accountable for by the same *Hypothesis*. Such are the Ebullitions rais'd in the Dissolutions of *Gold, Silver, Copper, Iron, Lead, Quicksilver,*

Metals,
 &c.
 no Alka-
 lies.

Nor Mi-
 neral Salts
 yet both
 Ferment
 with Acids.

Inflam-
 matory
 Fermen-
 tations
 with Ve-
 getable
 Essential
 Oyls.

ver, Coral, Pearl, &c. In *Aqua Regia*, *Aqua Fortis*, Spirit of *Nitre*, Oyl of *Vitriol*, Spirit of *Salt*, *Tartar*, *Alum*, Juice of *Lemons*, *Vinegar*, &c. the former of which *Metallick* and *Natural* Bodies, tho' the *Chymists* arbitrarily rank among the *Alkalies*, only because they Ferment with, and are dissolv'd by *Acids*, yet their Proceeding therein is very arbitrary, precarious, and without Authority; since all their Skill in *Analysis* cou'd never fetch any thing directly *Alkalious* out of 'em. With more Justice might they have reckon'd *Nitre*, *Vitriol*, &c. among the *Alkalies*. For these will not only Ferment with each other, but with their own *Acid* Liquors, and over and above upon Incineration afford a true *Lixivial fixt Salt*. Yet these were ne'er accounted *Alkalies* by 'em. Perhaps upon the Score of their yielding such an over-balance of *Acid* on the *Analysis*.

Whether it may be altogether so reasonable to exclude those *INFLAMMATORY Effervescences*, which arise from the pouring a highly rectified *Acid* upon the *Volatile Distill'd*, or (as they call 'em) *Essential Oyls* of *Vegetables*, from the number of those caus'd by *Acid* and *Alkaly*, is somewhat more a Question. For tho' these be what they call the *Sulphurs* of those Bodies, and that *Sulphur* taken strictly to their Meaning, be neither *Acid* nor *Alkaly*,

as being a Principle, and as such independent of *Acid* and *Alkali*, which are only two Classes of another Principle (*viz.*) *Salt*, yet the *Chymists* pretending that none of their Principles are to be extracted Pure, especially *Sulphur*, may alledge (as they really do) that these *Sulphurs* are highly charg'd with the *Volatile Essential Salts* of the *Vegetables*, which they may say is *Alkalious*; and that tho' the *Actual Inflammation*, which ensues upon some such Mixtures, proceeds from the *Sulphur*, which is their *Inflammable* Principle, the *Effervescence* is owing wholly to the Contrariety of the *Salts* of the two Liquors. But this is saying without proving, according to their usual, arbitrary, unaccurate Way. And therefore till they plainly demonstrate the *Volatile Salts* of *Plants* to be *Alkalious*, and to have such an Antipathy to *Acids*; it will be safer to acquiesce in the General Solution, that the Parts of the *Acid* insinuating themselves in great Plenty into the Pores of the *Oyl*, the Passage of the *Aether* was so interrupted, as to occasion an Explosion so violent to dislodge 'em, as was sufficient to produce an *Actual Flame*, which catching hold on the *Oyl*, its most ordinary *Pabulum*, it continu'd till all the *Oyl* was consum'd, but without any farther Ebullition or Explosion, the Passage being clear'd at once. They that consider how little countenance

Arbitrarily, Precarious Shift of the Chymists.

General Solution the most proper to be acquiesc'd in.

tenance the *Spirit* of *Scurvy-Grass* gives to the *Alkaliousness* of *Volatile Vegetable Salts*, will be apt to require more Proof than a *vulgar Chymists* bare Word.

Farther
Particu-
larities of
Spirit of
Scurvy-
Grass.

For besides the Phenomena, I have already mention'd from that *Spirit* mixt with strong *Spirit* of *Nitre*, it continu'd to send up numerous Bubbles, as often as I pull'd out the Cork for some Days, and retain'd both Smell and Taste intire, tho' somewhat over-power'd by those of the *Nitre*, yet very plainly to be discern'd thro' the other. The same thing it did, but more vigorously and plainly, mixt severally with *Vinegar*, *Juice* of *Lemon* (but without any Effervescence, Heat, or Ebullition) and was tasted as fresh in 'em, tho' mixt with a much larger Quantity, as *Sugar* cou'd have been; the Smell in the mean time over-power'd those of the *Vinegar*, or *Lemon* Juice, without destroying or damping either of 'em. So that the putting 'em together seem'd to have no other Effect, than that of simple Mixture. These, and divers other Tryals, as well with *Alkalies*, as *Acids*, convinc'd me, that it belong'd to neither of those Classes, since it neither destroy'd, nor was destroy'd by any of 'em. Till therefore I can be convinc'd what those *Salts* are, which are suppos'd to float in Vegetable Essential Oyls, and what share they have in these extraordinary Fermentations,

Proving it
neither
Alkali
nor Acid.

tions, I shall content my self with the foregoing Solution, and Range 'em among the Anomalous Fermentations of the *Chymico-Corpuscularian Hypothesis*.

There are other *Anomalous Fermentations*, which are excited by the pouring of Corrosive *Acid* Liquors upon divers Bodies of very distinct kinds, which might be accounted for by the foregoing *Hypothesis*; other Anomalous Fermentations why not accounted for here. such as those between *Oyl of Vitriol*, *Spirit of Nitre*, *Aqua Fortis*, &c. and *Simple Water*, *Spirit of Wine*, *Spirit of Scurvy Grass*, &c. of which it is sufficient to my present purpose barely to have made mention. For, not designing a compleat *History* and *Theory* of *Fermentation* at large; but such a restrain'd one only as should have regard to the *Theory* of *Animal Oeconomy*, I shall be particular only upon those kinds, which either have been already used (how justly soever) to illustrate and explain some parts of the *Animal Oeconomy*, or hereafter probably may be put to that Use by my self or Others. Having therefore spoken of the Principal *Fermentations* rais'd by high *corrosive Acids*, which I have therefore call'd *Artificial* or *Violent*, because the main Instrument that produces 'em, is procured by great Art and Violence of Fire, I pass over the rest in hopes, that (if what in the course of this Work I shall have to say against such sort of Illustrations, be of any Weight) we

K

shall

shall not for the future be troubled with such *Precarious Theories*, as will stand in need of such Fallacious Supports.

By Natural or Spontaneous what meant.

I come now to those gentle kinds of *Fermentation*, which I have ventur'd to call NATURAL, or SPONTANEOUS, not that I do not know that even these are sometimes procur'd, and often promoted, by Humane Skill and Industry : But because they work in such a manner, as Nature her Self does in many of her Productions, and are urg'd on by such Means as are of her furnishing, or so much resemble those, that they seem as it were of her prescribing.

Natural Fermentations not illustrable by the Common Experiments of the Chymists.

Leaving here the Laboratory and all its Pompous *Apparatus*, we must return into that of Nature, where every thing is perform'd by a Method and Instruments more Simple, and by a Mechanism therefore as much more wonderful, as its Effects surpass in Beauty, Variety, and Use, those of Humane Art. Into this Field likewise the *Chymists* have attempted to thrust their Sickle, and to limit the Operations of Nature to the narrow Principles of their Art, and to account for all the visible Phenomena in the three Kingdoms, into which (according to their Jargon) they divide the Terraqueous Globe, by their *Tria Prima*, or *Five* Principles, dividing as Arbitrarily among 'em the several Effects of Nature

Nature, as if they had been the Authors, but with as little Judgment as if they were not rational Contemplators.

In the sort of *Fermentations* I am now to speak of, AIR is the *principal* Instrument, the *first* MOVER, in these neither the *Chymical* Principles, nor their *Acid* and *Alkali* have any thing to do. For tho' in many of the Bodies Fermented this way, some of their Principles, and sometimes all may upon Analysis be found, yet I think it pretty plain that neither they, nor their *Acid* and *Alkali* as such, contribute any way to the Phenomena produc'd.

Air the
Principal
Agent or
Mover.

I shall not pretend to determine what share the *Æther*, or *Materia Subtilis* of the *Corpustularians* or *Cartesians* may have; Because I do not know how far that may enter the Composition of that Aggregate Fluid Body, which we call AIR. But I am apt to think that it has not much to do in in this sort of Fermentations, otherwise than as it makes a part of the Compound.

AIR, of how many soever different sorts of Particles or Atoms it may consist, is agreed to be a *Springy Elastick* Body, compressible it self, and able by its Weight to compress others, which are the only qualities necessary to the present purpose.

Air, how
Instrumental
in Fermentati-
on.

*Included
in all Com-
pressible
Bodies.*

It is farther found by Experience, that all sorts of Bodies, whether *Fluid* or *Solid*, that are not too hard to yield to such Tryals, as the Curious have been hitherto able to make, contain in 'em a greater or less Proportion of included *Air*. The *Torricellian* Experiments, and Mr. *Boyle's Air Pump* yet more amply, have sufficiently demonstrated, that even the most Dense of *Fluids*, contain a considerable quantity of it, and that some Bodies reckon'd among the *Solids*, are not destitute of it: Though in these latter the proportion is not so easily found, because these Bodies do not so readily yield to *Compression* or *Elasticity*. Yet that many of these do include no small quantity, the dissolution of *Bones*, made in Mr. *Papin's Digestor*, affords us reasonable grounds to believe: Tho' the Materials, of which that Engine must necessarily be made, not being diaphanous, we cannot observe the Gradations or Steps made towards that Solution. But of this we shall have occasion to speak more hereafter.

*Subservi-
ent to Ve-
getation.*

Divers Naturalists have offer'd curious Speculations concerning the *Vegetation* of *Plants*. Some have employ'd themselves about the material Principle from which they receiv'd their Augmentation: Others about the Vessels through which it was convey'd, and the means by which it was rais'd, Speculations which I have nothing to

to do withal here, any more than to inquire, whether the different Species spring from *Seminal* Principles really and unalterably differing, or from the same Matter variously modify'd by several and peculiar Organs. All that I shall offer in this Case is, that I think that their various degrees of *Vegetation*, depend upon the different degrees of Expansion or Rarefaction of the *Air* contain'd in their several Juices, which will be greater or less, as External Circumstances, and the Texture of the Vessels of the several Plants themselves concur to affect or admit it. Thus we see the same Species of Plants promoted or retarded in their growth, even in the same Soil, by the increase or decrease of Heat, whether *Artificial* or *Natural*.

In these *Fermentations* of Liquors, which are partly Natural, partly Artificial, those are observ'd to be forwardest, which are most impregnated with *Air*, as we find in *Must*, *New Malt* Liquors, &c.

It has been found by Tryals in Mr. Boyle's *Bubbling of Liquors in Vacuo* Engine, that those Liquors, which are specifically lightest abound most with *Air*, as *whence*. appears by the different degrees of Bubbling and Intumescence upon the exsuction of the *Air*. This to me appears to proceed from no other Cause, than that by taking off the incumbent Weight, opportunity is given to the included *Air* to dilate and ex-

pand it self. For tho' some Liquors will in that Engine bubble more than others, that swell more in Bulk, and are specifically lighter, yet this seems to depend not only upon the *quantity* of the *Air* included, but upon the *Viscosity* of the Liquor it self, whose surface will not so easily break without first rising as it were in Blisters.

Bubbles
most fre-
quent and
permanent
in Viscous
Fluids.

The common Experiment which Boys make of blowing *Bubbles* evinces this pretty plainly, for tho' in *Simple Water* it will not succeed, yet if a little *Soap* be incorporated with it, it will bear being blown up to a very great degree, so as to be let fly from a Pipe in pretty large Bladders, and so float for a considerable time in the open Air, and last more or less time, according as the Body of the Water, which makes the Shell of the Bubble, is more or less extended at its first parting from the Pipe. So in the Engine *Oyl* of *Olives* affords more, larger, and more lasting Bubbles than *Water*, which are owing to the lightness arising from the quantity of *Air*, and the tenacity of the Liquor. *Spirit* of *Wine* yields more numerous but less lasting Bubbles, and swells higher than *Water*. And *Oyl* of *Tartar per deliquium* affords very few, and no Intumescence. These Experiments compar'd, shew, that the *Specifick Gravity* of Fluids depends upon the quantity of *Air* they include, and that the largeness and duration of

Specifick
Gravity
of Fluids
whence,

of the *Bubbles* is owing to the consistence of the Fluid, thro' which the *Air* that composes them, makes it way. Let it be no Objection hereafter, when we come to apply this Doctrin to *Animal Fluids*, that all these Experiments we instance in here, are made upon the Product of *Vegetables*. For the same Tryals have been made upon *Animal Liquors*, which answer equally according to their *Specifick Gravity* and *Tenacity*, tho' it be not proper in this place to recite them.

It has been a general Observation, and is, in the main, true, tho' it does not always prove so, that the more mixt and compounded a Liquor is, the more ready it is to *Ferment*. Of this Observation the *Pyro-sophists* have made great Advantages, pretending that all the Tumult and Bustle that is observable in those Liquors arises from the jarring and disagreement of their Principles. This in my Mind makes rather against, than for their Philosophy. For if their Principles, whether they make *Two*, *Three*, or *Five*, must needs be the *Elements* or *Hypostaticks* of all Bodies, it seems more natural that they shou'd readily close and cement, than by such a disagreement break that Union, and discompose that Body, in which at last they must coalesce. But as indeed they have never brought any satisfactory Proof that all Bo-

Com-
pounded
Liquors
why readi-
est to Fer-
ment.

Bodies must be compounded of their Principles, so neither does it appear, that this Tumult in mixt Bodies arises from 'em, and therefore this Observation neither makes for or against 'em any farther, than that it shews them Arbitrary and Unaccurate in their Accounts. But *Heterogeneous* Liquors containing Parts diversly figur'd, do not subside so close, as the more *Homogeneous* whose Parts from the Congruity of Figure ranging closer together, admit of less Air in their Interstices, and consequently are less obnoxious to a Tumultuous Rarefaction, which is, what is call'd *Fermentation*.

From the
Internal
Disposition
of the Li-
quors not
variety of
Elements

For as Mixtures may be made of a great number of Fluids, without any subsequent or lasting *Fermentation*, as of *Water*, *Wine*, *Sugar*, and *Juice of Lemons*, &c. so there are some other which after having become as to Sense *Homogeneous* are, upon every slight occasion, as a little Motion, or standing warm, prone to Effervesce very strongly, as *Diacodium* will do, that seems as little or less compounded than many that will not do it so readily, nor to that degree, which plainly shews that it is not bare mixture, but an Internal Disposition in some Fluids, greater than in others, that occasions the different degrees of *Fermentation* under the same External Circumstances.

The

The *express'd Juice* of *Grapes* (which is call'd *Must*) is a *Liquor* that abounds with *Air*, as its *Specifick Gravity* shews, and therefore readily Ferments, and flings up to the Surface a sort of *Scum* abounding with *Air*, which is call'd the *Flowers*, and consists only of some of the more *viscous* Parts mixt with some of that *Air*, which has made its escape thro' the thinner part of the *Liquor*, as appears by the Texture of it, which is only a heap of little *Bladders* fill'd with *Air*, which during the time of *Fermentation*, heaves and swells it into many *Blisters* on the Surface, which last, (like the *Bubbles*, which *Boys* blow,) till that *Viscous Cortex* is extended beyond the *Cohesion* of its Parts, and then break. The same happens to *Malt Liquors*, and others compounded of *Light* and *Viscous Bodies*, the *Flowers* of all which consist of *Particles* in that respect resembling each other, and which, if cut thro' when dry, or near it, shew a *spongy Texture* abounding with little *Cells* of included *Air*. This *Yeast*, or *Flowers* of *Wine* or *Beer*, if put to *Liquors* that Ferment, but sluggishly, will, as common Experience shews, make them Work very briskly.

The *Chymists* may perhaps pretend that it is the *Acid in Fluore*, with which these *Flowers* abound, that occasions this *Fermentation*. But then there will be two *Difficul-*

Fermentation of Must and other such Liquors.

Flowers of Wine or Yeast promote Fermentation, why

Not by Acid and Alkali.

ficulties for them to answer. First, where is the *Alkali*, upon which those Acids shou'd operate as such? For none of these Liquors afford any, but from the *Incineration* of their *Lees* or *Tartar*, to produce which, or at least to disengage 'em from the Bodies, to which, before they were strictly united, violence of Fire is requir'd. And that, if before really Existent, was so implicated in other Bodies, as not to contribute any thing to the Operation they wou'd lay at its Door. And next, why those *Flowers* of *Wine* or *Beer*, which after keeping, will grow very Sower, but will subside, and let out a great deal of the Air they before contain'd, shou'd not Operate more briskly in this State than in the former, which if their Activity lay in the *Acid*, they must necessarily do? But Experience demonstrates just the contrary, and shews that they may be kept till they are very Sower, and absolutely unfit for forcing *Fermentation*.

Nor by
their Vo-
latile Vi-
nous Spi-
rit.

They that attribute the *Fermentations* of *Wine*, and other Liquors of that sort to the Activity of the *Volatile Vinous Spirit*, and wou'd have that put the rest in Motion, have at least more shew of Reason on their side. For it is evident from Fact, that this *Yeast*, or *Flower* of *Wine* or *Beer*, affords in Proportion more *inflammable Spirit*, than the Liquor it self after this Purgation. But
then

then why shou'd not this Spirit, when extracted and defæcated by *Distillation*, act more vigorously, and ferment the Liquor more violently? On the contrary it will not in the least move it.

Among all the Experiments of *Artificial Leven Fermentation*, there is not one that countenances the Notion of its proceeding from an *Acid*, except the *Salting* of *Leven* only: Which those that wou'd derive all sorts of *Fermentations* from *Acid*, and *Alkali*, pretend to be done in order to impart an *Acid*, and so exalt the *Ferment*, whereas they mistake the meaning of those that do it, which is only to preserve it from growing Musty and Stinking.

All the rest shew plainly that their *Acti-* Whites of
on depends neither upon *Acid* or *Spirit*; Eggs be-
nor in some can the most biggotted *Chymist* ten up to a
discover any of these. When some *Wines* Ferment.
(whose Colour is not inconvenient for such a Method) Ferment sluggishly; or want to be Re-fermented, the Skilful *Wine-Coopers* use *Whites* of *Eggs* whip'd up with a Whisk, so as to be very Light and Spumescient, which they stir into their Wines, and so set them again upon the *Fret*.

It can't be pretended that there is this *Without*
Case either *Acid* or *Vinous Spirit*, or in- Acid or
deed any thing natural in the *White* of *Spirit*,
Eggs, except their *Viscosity* that contributes
to their *Activity*. By means of that in-
deed

deed it inviscates, and engages the *Air* upon Conquassation, and thereby becomes capable of being equally mixt thro' the Body of the Liquor, and consequently of raising such a *Fermentation* as the Artift wants before it can Extricate it self. For the *Air* being in this State compress'd, does by its *Elasticity* naturally tend to recover its former degree of Expansion, and not being able to do it all at once by means of Explosion, occasions a continu'd Series of Succussions *Quaquaversum* in the Liquor, by which means several Concurrences and Combinations of the several Particles that float in it are occasion'd, whence follows that Subsidence of the heavier, which is call'd *Precipitation*, as the Motion it self is *Fermentation*

Fermentation or Fretting of Wines by driving with Bellows.

But if these, and all other Methods of *Fermentation* hitherto mention'd, might be suspected of some secret latent Quality in the Ingredients us'd to procure it, there remains yet one in use among the skilful Brewers of *Wine*, and other Liquors, which is beyond all possibility of Exception, exempt from such a Suspicion. This is the way of doing it by BELL O W S only, in which they use a large pair of Bellows with a Stop-Cock upon the Snout. The end of which is thrust thro' a Perforation made on purpose in the end of the Vessel, from which the Liquor is to be driven thro'

thro' the Cock, at the other end into another Cask, which in Case of Prickt Wines is generally furnish'd with a rich Spiritous Lee, with which the Wine by means of this impregnation, with *Air* is made to ferment, incorporate and repurge it self again, and by this means decaying Wines are frequently restor'd, and made sound, and sometimes better than at first.

In this Case neither *Acid*, nor *Alkali*, nor *Spirit*, nor any other imaginary Agent, except *Air*, can have any thing to do; because nothing else is mixt but Wine, and Lees of Wine, which simply put together will not succeed so, let them agitate 'em how they please, unless something be added to 'em, which is incorporated with more *Air* than the Parts of the Wine it self.

It is true, that *Vitriol*, *Arsenick*, and some other Bodies not so impregnated with *Air*, will in the high colour'd Wines help to strike the Tincture deeper: But they are so far from forwarding the *Fermentation*, that they check it, and hasten the *Precipitation* of those heavy Parts, which by an Union with them are carry'd down along with them.

It may not be improper here, tho' not directly to our present Purpose, to take notice that Wines thus fin'd down (as the Vintners call it) may Purge themselves entirely

Precipitation, or finishing of Wines by Arsenick, &c.

An Instance of its danger.

tirely from these dangerous Drugs by their absolute Subfidence. Yet if the Wines remain never so little upon the *Fret*, it wou'd be very hazardous to drink of 'em in that State. Of this I happen'd to see an Instance in a Company of almost a dozen Men and Women: Of whom, he that drank most, did not drink above a Pint and an half to his share, and some of the Women scarce half a Pint; yet every one of 'em were taken with *Violent Vomitings*, which were follow'd afterwards with large *Eruptions* or *Blotches*, with other Symptoms of a high degree of *Arsenical Poison*. However, not having drank much, with Care they all did well; but sooner or later, according to the Proportion of their Drinking.

*Causes of
other Fer-
mentati-
ons easily
deducible
from the
Premises.*

The Design of this Chapter does not oblige me to go thro' the *Theory* of fermented Liquors, tho' there is scarce any of 'em, which may not be accounted for as demonstratively as *Physical* Matters will bear by one or other of the ways already laid down: Especially those which tend to the Perfection, or Exaltation of the Liquor, that is, to render it more *Spirituons*, or manifestly *Vinous*, which is the only *Fermentation* which some will allow to be a true one.

I shall not in this Place make any particular Application to *Animal* Fermentations, because

because that must be done in its proper Place, when I come to speak of the Properties and Accidents of the several respective *Animal* Fluids, in order to which only I have made this Digression about *Fermentation* in general, to prevent a confusion of Idea's, or unnecessary Repetitions.

C H A P.

C H A P. XIV.

Of DIGESTION and CHYLIFICATION, and the Apparatus thereunto conducting.

Organs of
Digestion
very vari-
ous.

THE Almighty Author of which (to avoid Circumlocution and unnecessary multiplication of Words) I often call *Nature*, having in his inscrutable Wisdom thought fit to create a great variety of *Animals*, and to appoint 'em different ways of subsisting, has also given them very different *Organs* to prepare that *Aliment*, by which they are to be *Nourish'd*.

Teeth
why differ-
ently shap'd
and dispos'd
in Animals
of different
Feeding.

Of these some, being to break, and divide the *Mafs* upon which they are to feed, are furnish'd with **T E E T H** of different kinds, according to their several Exigencies: Those, which feed upon *Flesh* have *Teeth* in every part of *both* Jaws, some of which are to divide the *Mafs* into *Morsels*: Others to comminute, and grind it after it is so divided, which from their different Offices are some call'd *Incisores*, or *Cutters*, others *Molares* or *Grinders*. Some *Animals* which are *Graminivorous* have the *Incisores* in the *Lower Jaw* only, because the *Matter* upon which they feed, is easily broken into such *Parcels*, as they can readily swallow.

Of

Of the first sort are *Men, Lyons, Bears, Wolves, &c.* of the latter are all the *Ruminant* kind, such as have *Horns* and *Split Hoofs*, as *Oxen, Deer, Sheep, &c.* Others, which are generally such as live upon *Grain*, or other sorts of *Food*, that do not want to be broken before they are swallow'd, have no *Teeth*; but instead of 'em have an *Ingluvies* or *Crop* wherein the *Food*, which is generally hard and dry, is macerated and softned before it is transmitted to the *Stomach*, which is *Musculous*, and stronger than in other *Animals*, and serves instead of *Teeth* to break and grind the *Aliment* so macerated, in order to *Digestion*.

Grani-
vorous *Animals*
have no
Teeth

But an In-
gluvies, or
Crop

Of this sort are most kinds of *Fowl*, especially the *GRANI-VOROUS*: Tho' some others which are *Birds of Prey*, and live upon *Flesh*, have no *Teeth*, yet they have something analogous to the *Incisors*, which is generally a *sharp, crooked Beak*, that serves to cut, and divide that, which they feed upon. These have no *Gizzards*, or *Musculous Stomachs*: And tho' there are some which have something like *Teeth* in their *Beaks*: Yet those *Teeth* do not serve them either to divide or grind their *Food*, but to take the surer hold of their *Prey* only, and are peculiar to the *Fishing Fowls*, whose *Prey* wou'd otherwise be more apt to escape them, and some of the *Water Fowls*, that

Peculiar to
Granivo-
rous Fowl

Gizzard
peculiar to
Granivo-
rous Fowl

eat

eat Herbs, which, if their *Beaks* were not indented, wou'd slip from 'em. These as well as some sorts of *Reptiles*, as the *Viper* kind, have *Teeth*, yet swallow their Prey whole.

Mastication of what use.

I have mention'd these several kinds of *Dentation* in order only to examin the true service of *Mastication*, which seems to be in a manner peculiar to Men. For, tho' some other *Animals* use it, it seems to be only when their Food is only too hard, or too dry to be swallow'd unchew'd, as *Lyons*, *Dogs*, *Bears*, &c. when necessity forces them to eat *Bones* : Or *Horfes*, *Beans*, *Pease*, *Oats*, or other hard dry things. In these Cases *Mastication* seems to be purely preparatory to Digestion, and to be necessary to reduce the Aliment to such a State as may fit it for the Operation of the *Stomach*. But whether that contributes any more than bare *Comminution* remains yet a Question.

In Men communicates no Ferment.

Men, who *Masticate* more upon less necessity than other *Animals*, are generally thought by *Authors* in that *Action* to impart something to the *Mass* besides the *Comminution*, which they think conduces in an extraordinary manner, by way of *Ferment* or *Menstruum*, to the Solution of what they Eat. But as this *Mastication* is not constant nor equal in all Men, who seem to digest with equal Facility ; it is still a reasonable Doubt, whether some Uses, which they have

have assign'd to *Mastication* be true ones or not, and whether *Luxury*, and the *Pleasure* of *Eating*, has not taught Men to Chew, more than other Animals, in order to have the fuller relish of their Food.

It is certain that many *Creatures* as well *Prov'd by Instances.* provided for *Mastication* as Men, and whose *Salival Glands* discharge as much as the *Humane* into their Mouths, do not give themselves the trouble of so much *Mastication*, and yet with the same *Apparatus* of *Organs* digest as quick, if not quicker, than Men do. And if *Old People*, who have lost all their *Teeth*, have sometimes worse *Digestions* than those who have not, other *Causes* may reasonably be assign'd for that *Infirmity* of *Digestion*, than the want of *Teeth*. For it is observable, that *Younger Persons*, who sometimes from other *Accidents* lose their *Teeth*, have not their *Digestive Faculty* weaken'd in proportion; not to mention that many *Animals*, which have either no *Teeth*, or don't use those they have to Chew with, seem to have as vigorous a *Concoction* as those that do. However I shall not deny, but that the *Comminution* of the *Aliment* between the *Teeth*, serves to promote, and hasten the *Solution* in the *Stomach*, which it may do by bare breaking the *Cohesion*, without supposing any necessity of a *Menstruum* to do it afterwards.

*Small
Birds, es-
pecially
Parrots,
have some-
thing equi-
valent to
Mastication.*

Many *Species* of BIRDS, especially the *little Ones*, that feed upon the smaller sorts of Seed, and have no *Teeth*, nor any thing that bears Analogy to them (except the sharp edges of their little *Beaks* may be thought to do so) make however an use of these *Beaks*, which in some measure answers the end of *Mastication*. For by these they crack the Seeds, and with the help of their Tongues separate the soft Pulp from the dry Husk which they let fall: And particularly all of the *Parrot-kind*, which will feed upon the Kernels of Nuts, and other things, which are too large to be swallow'd whole, have a sort of Action, which looks very much like *Chewing*, by which they nibble upon what they Eat, till they reduce it to very small Parts, tho' it seems not so much in order to mix it with any *Ferment*, as to reduce it to such a State, as may make it pass the easier; and perhaps if they have any *Saliva*, it is no more than serves to lubricate, and facilitate the slipping of their Food down to the Stomach, which wou'd not be so easily effected if it were dry, as most of the things they live upon are.

*Ingluvies
or Grop,
answers
the end of
Teeth in
Granivorous
Fowl.*

Those that generally feed upon *Grain*, as all the *Gallinaceous*, *Turky*, *Pheasant*, and *Partridge* kind do, are observ'd to swallow every thing hastily, without any stop of it in their Mouths, or any endeavour to break

break it there. But then indeed they have an *Ingluvies* or *Crop*, where it remains some time for *Maceration*, before it be transmitted to the *Stomach*, which those that contend for a *Ferment*, may say is given them instead of *Mastication* to impregnate the Aliment with that *Ferments*, which however is *gratis dictum*. For tho' the *Crop* of such *Fowls* be furnisht with *Glands*, and the *Grain*, which they Eat, be actually softned by the soaking which it receives there: Yet no real Solution or Separation of Parts is there made, but in the *Gizzard*, the strength of whose *Muscles*, and *Internal Membrane*, which is hard and dry, as well as the little *Stones*, and *Grains* of *Sand*, which these little *Fowl* swallow, shew these Parts to be contriv'd for *Attrition* and not for *Fermentation*, which the Narrowness and Strength of those Parts will not give room for.

It is true that most, if not all *Fowls* of this kind, have at the lower end of their *Oesophagus* a considerable quantity of *Glands*, which afford a Liquor more visible than even those of the *Craw*, and which many *Anatomists* suppose to separate a *Fermentative Juice*. But for that we shall assign another Use, (which it cannot be deny'd to be proper for) when we come to speak of the *Conversion* of the *dissolv'd Aliment* into *Chyle*.

Lower Extremity of the Oesophagus Glandulous in Fowls, that have a Gizzard.

Teeth in
many Ani-
mals not
used for
Masti-
cation tho'
very sharp.

Indented
in Fishes.

Recurv'd
in the Ser-
pent kind

Wherefore,
Grinders
in some
sorts of
Fish,

There are divers kinds of *Animals*, that not only have *Teeth*, but have them likewise sharper, and more numerous than *Men*, or indeed any sort of *Quadrupeds*, as divers kinds of *Fishes*, and all the *Serpent* kind, yet none of these use them for *Mastication*, as appears from their Figure and Position, which renders them absolutely unfit for it. For in *Fish*, many of which have three, four, or more rows of *Teeth* in each *Jaw*, they are generally extreme sharp, and not planted opposite to each other, but so as to make, when the *Jaws* are clos'd, a kind of *Indentation* like that of two Saws, so wrought as to receive each other mutually, which is not a Position proper for *Grinding*, but very convenient for *catching* or laying hold of any thing. In the *Serpent* kind there are likewise divers rows of *Teeth* extremely sharp, but all incurvated, and pointing towards the Throat, which is a situation very proper for entangling, and helping to swallow their Prey, which is usually small living Creatures, which they devour whole, but altogether unfit for dividing, comminuting or bruising. Some sorts of *Fish*, which Prey upon the small *Shell-fish*, such as *Cockles*, *Muscles*, and *Sea-Snails*, have indeed a sort of flat, broad *Teeth*, which resemble in some measure, in Use, as well as Figure, the *Grinders* of *Land Animals*; that is, they serve to break the Shells of

of those little Fish before-mention'd. These are variously dispos'd in the different *Animals*, some in the *Throat*, or upper part of the *Oesophagus*, as in the *Orbis Marinus*, others even in the *Stomach* it self, as in *Lobsters* and *Crabs*, which have three at the bottom with peculiar *Muscles* for their Motion and Compression.

As *Providence* has allotted for the Sustainance of the several Kinds of *Animals* a great variety of *Food*: So it has given them likewise a proportionable diversity of *Organs* for the Preparation of it, besides those which serve for the first *Divison* and *Mastication* already spoken of. The various sorts of *Animals* have, according to the different occasions of their kind of Aliment, a great variety of *Stomachs*, both in point of Number and Structure, which may however in the main, be reduc'd to three Principal or General Heads, of which in order to Illustrate our Notion of *Concoction*, we shall speak more particularly. For tho' the several *Species* be almost indefinite, yet these being most considerable and best known to us, may suffice to shew the *Mechanical Apparatus* of *Nature*, for this Operation.

The three I mean are the *Carnivorous*, the *Graminivorous* and *Granivorous*. The different *Mechanism* of whose several *Stomachs* seems under one Head or other to

Variety of
Stomachs
reducible
to three
General
Heads or
Kinds.

of Carni-
vorous
Gramini-
vorous,
and Gra-
nivorous.

include all the conditions necessary for the *Solution* of any thing conducing to *Animal Nutrition*: And of each Species, of which there are some Animals in each habitable Element, unless we will deny any *Fishes* to be strictly *Granivorous*, the Water not Spontaneously affording them any such sort of Food.

Account of
Appetite
why Post-
pon'd.

According to the usual Method, *Hunger* shou'd first be accounted for, because it is that which provokes us to Eat, and therefore the accidental Cause of all that follows in the Course of *Digestion*. But that being agreed by all *Authors* (however differing among themselves otherwise in Opinion,) to depend upon the same *Active*, or *Efficient Cause*, with *Digestion* in it self: It will save an unnecessary multiplication of Words to Postpone the Account of it to that of *Concoction*.

Disagree-
ment of
Authors a-
bout the
immediate
Instru-
ment of
Conco-
ction.

Authors are very little agreed about the immediate Instrument by which the Aliment is dissolv'd in the *Stomach*. Some will have it to be done by mere *attrition* or grinding by the *Stomach* it self. Others impute it to a forcible *Dissolution* of *Heat*. But the Opinion, which is most espous'd, is, that it is perform'd by means of a *Ferment* or *Menstruum*, yet of what Nature, or to what *Class* it belongs, they are as little agreed among themselves, as with those who wou'd have it perform'd some other way.

Those

Those that wou'd have it done by *Attrition*, impute it to the Rubbing of the *Stomach*, upon the Aliment by its *Peristaltick Motion*, and fortify themselves by the Observation, that *Fowls* and *Birds* that eat *Grain* and *Seeds*, have not only a strong *Musculous Stomach*, lin'd inwardly with a *thick, tough Membrane*, fit for grinding, but do likewise assist that Operation of the *Stomach*, by swallowing *Grains of Sand*, and *little Stones*, which are always found mixt with their *Meat* in the *Gizzards* of those *Fowls*, when they have eaten hard *Meat*, unless it be in *Domestick Fowls*, which have been coop'd up, and restrain'd from coming at 'em.

If indeed Men did feed, as those *Fowls* do, upon *Grain* or hard *Meat*, without *Mastication*, and were furnish'd with a *Stomach* so tight, firm, and strong, and so lin'd, this wou'd not be an improbable *Hypothesis*; but as our Food and manner of Eating are very different, so is the Mechanism of *Nature*. And as the *Texture* of the main *Organ* of *Concoction* the *Stomach* is soft, smooth, and yielding: (Qualities altogether opposite to those that are requir'd to grinding) so Providence has given us an Appetite to things *resoluble* another way. But if *Grinding* or *Attrition* were the *Human* way of *Digestion*, the *Mouth* surely, and not the *Stomach*, wou'd be the proper Place

Attrition
or Grind-
ing.

Not the
Digestion
of Grani-
vorous A-
nimals.

Place where it shou'd be perform'd; for that is furnish'd with *Teeth*, proper Instruments for that purpose. But whatsoever *Mastication* may contribute towards *Digestion*, that it is not the only, nor indeed the main Instrument of it, we have already sufficiently prov'd by the Instances we have given of the many Animals, the Substance of whose Food is the same with ours, which *Masticate* very little, and most of 'em not at all.

Wherefore if the *Stomach* were capable of grinding the Aliment, as some suppose, it must however in a little time necessarily be worn as all other Bodies, which grind by degrees, are, how hard soever, especially since many Things, which we use as *Food*, are harder and tougher even than the *Stomach* it self.

Macera-
tion pre-
vious to
Attrition
even in the
Granivo-
rous.

But they are mistaken who think that even in *Granivorous* Fowls, the *Grain* which they eat, is ground in the *Gizzard* when hard. For that *Grain* which is found in the *Gizzards* of those Creatures, is, tho' unbroken, always Macerated, Swell'd and Soft: So that the *Gizzard* has not much more to do, than to break the *Husk* or *Cortex* of it, to reduce it to a *Palp*. And for this very end it is, that all this sort of Animals are furnish'd with an *Ingluvies* or *Crop*, where the Aliment always makes a considerable stay, and in which it is often found

found Soft, tho' always unbroken, if it be *Grain*. Whether this *Maceration* proceeds from any Liquor separated by the *Glands* of the *Craw*, or from the *Water* which those *Fowls* drink, may be a reasonable Question. But as those *Glands* do not seem sufficient of themselves to furnish Liquor enough for that purpose without their Drink: So on the other hand it is not unreasonable to believe, that the Liquor which they afford may contribute towards making their Drink, with which it mixes, more Active and Piercing, and so serve to soak it better and quicker than simple Water wou'd do.

Those that wou'd have the Aliment to be dissolv'd in the *Stomach*, by the meere Virtue of *Heat* only, like a kind of *Elixation* or *Stewing*, will find a great deal of difficulty to prove their *Hypothesis* reasonable, unless they call in some other *Mechanism*, or Circumstance, than I have hitherto had the Fortune to meet with among their Arguments. For none of them, that I know of, has given a satisfactory Reason, why Meat shou'd dissolve faster in the *Stomach*, than it does out of it by the same degree of *Heat*, or indeed a much greater. It wou'd be Impertinent at this time of Day, to pretend that *Culinary Fire* was not so *Natural* a Dissolver, as the *Vital Animal Heat*; and yet no Care has been taken by those,

Nor Elix-
ation, or
Dissolution
by meere
force of
Heat.

Difficul-
ties affect-
ing this
Hypothe-
sis.

those, that hold this Opinion, to find out any other certain Property of this *Heat* to which they might rationally ascribe that *Acceleration* of *Solution*, which is observ'd in the *Stomach* by many degrees to out-strip that *Dissolution*, which is made in the usual *Organs* over a *common* Fire: And to pretend that the *Heat* was actually greater, and more intense, than that which is us'd in *Cooking* our *Viſuals*, wou'd not only be a bare-fac'd Assertion against *Fact*, but against *Reason* likewise: For if it really were so, why shou'd not the *Stomach* it self be *boil'd* and *dissolv'd* by the *Heat*, as well as the *Meat* contain'd in it, which wou'd constantly happen in all other Operations by Fire or Heat, if the Matter contain'd were as hard to be dissolv'd, and wou'd resist as strongly as the Vessel containing? But not to pursue an Opinion any further, which in my Judgment at least, has a better Foundation than those who have casually espous'd it, have hitherto been able to make out, we will proceed to examin the reigning *Hypothesis*, which, taken in its largest extent, is become of late the Favourite, and only prevailing Opinion.

No Fer-
ment or
Menstru-
um pecu-
liar to any
of the Or-
gans of
Digestion

Those, who observing how unqualify'd the *Stomach* of *Carnivorous* Animals generally is for *Attrition* or Grinding, and therefore cou'd not believe the Aliment to be reduc'd to a Pulp that way, and yet were not

not satisfy'd that the Incalescence of the *Stomach* was sufficient for that Operation, have call'd in the help of a *Menstruum* or a *Dissolvent* Liquor, by means of which, they have thought to account better for the speedy *Resolution* of the Contents of the *Stomach*, than by either of the other more *Simple* ways.

But this being matter rather of Imagination, than Fact, easier to be suppos'd than prov'd, after first conceiving a necessity of such a Liquor, they have employ'd themselves more generally to invent the *Properties* and *Qualifications* of it, than to discover whether in reality it had a *Being* or *no*. So that this *Hypothesis* stands altogether upon Conjecture, as well as to the *Existence* of their *Menstruum*: As to the *Nature*, *Properties*, and *Derivation* of it. From hence it comes to pass that such a variety of *Menstruums* have been invented, every Man feigning it to be such as he conceiv'd wou'd best answer the Difficulties and Doubts which he propos'd to himself, to resolve by it. Hence some have fancy'd it to be an *Acid*, other *Alkalious*, a third sort *Sulphureous*, a fourth *Acido-Sulphureous*, others *Alkalino-Sulphureous*, *Muriatick*, or of any other kind that their Fancy suggested to them as proper for the Work of *Dissolution*, or exciting of *Appetite*.

As

Various
Derivati-
ons of the
Menstru-
um.

As many Conjectures they have had a-
bout the Place of Nativity of this *Menstru-
um*: Some fetch it from the *Spleen* by the
Vas Breve: Others from the *Brain* by the
Nerves: Some from the *Blood* by the *Arte-
ries* in the Stomach, and others from the
Glands of the *Mouth* and *Stomach*; in favour
of all which curious, Notions and fine
Speculations have been advanc'd, at the ex-
pence of Truth.

Acid Fer-
ment, how
taken up.

The *Chymists* and *Physicians* *Chymically*
given, have generally been the Patrons of
an *Acid Ferment*, upon a Notion at large,
that *Acids* are the *Universal Dissolvents*;
which Opinion many others have given
into upon the Account of some few *Pha-
nomena*, which they cou'd, or thought they
cou'd, resolve by it; but especially upon the
Account of an *Aphorism* of *Hippocrates*,
which they think Countenances it, tho'
mistakenly.

Hippo-
crates's
Meaning
mistaken.

* Ἐν τῇσι
χερίνοι
λειτουργί-
σιν ὅξυ-
ρεγμίν
ἐπιρρο-
μῶν, μὴ
ῥυομῶν
πρότερον,
σημῆον
ἀγαθόν.

This Great Father of Physick has
Aphor. I. Sect. 6. said, That * *ACID*
BELCHINGS supervening upon *Inveterate*
LIENTERIES, (that is, upon *Loosnesses*
from a too great *Slipperiness* of the *INTE-
STINES*) where they were not before, are a
Sign of Mending. And Lib. 7. *Epidem.* he
says again the same thing, a little more at
large, and affirms, that, whether this *Symp-
tom* come spontaneously, or be procur'd by
Art, it equally cures the *Distemper*, "ἰσως
δ'.

δ' ἐστὶ καὶ πυχνότης, καὶ γὰρ αἱ παραχαί αἱ ταῦτα
ἀλλοιοῦσιν. Ἰσως δὲ καὶ οὐρεγμία λειονπερίω λύουσιν.

From hence some would infer, that *Hippocrates* suppos'd *Acids* to contribute to good *Digestion*, because, those Signs of *Acidity* in the *Stomach*, whether they come *spontaneously*, or were *artificially* superinduced, generally signifies, according to him, a *Solution* of that Disease which was attended with *Crude Dejections*. And his Authority brought to Countenance a False Notion.

But, in my mind, they strain his meaning very much, who will, from either of these Passages, make the *Divine Old Man* hold, that the *Acidity* of the *Stomach* was necessary *ad Eupepsiam* in the *Natural* State. Whereas in truth all that he says in this case, concludes no more, than that these *Acid Belchings* signify'd, that the State of the Sick Person was alter'd for the better, when the *Assumpta* remain'd so long as to turn sour upon the *Stomach*: Or at most, that *Acids* given inwardly, and staying so long as to send their Exhalations upwards, might contribute to the Cure; a Position which any Body may admit, without supposing an *Acid* to be the necessary Instrument of *Concoction* in a *Natural* State: But what Signs soever *Acid Belchings* may be, in a *Morbid* State of this kind; no sort of *Ructus* or *Flatulence* whatsoever, is any Sign of a good *Digestion* in a *State of Health*. The Author's Construction of those Passages in Hippocrates.

However,

However, they that have been prepossess'd in Favour of an *Acid Menstruum* in the *Stomach*, have very greedily laid hold of this occasion, to draw so great an Authority over to their side.

Argument
from Ex-
citing Ap-
petite
Fallacious.

The other Argument, which they bring for their Opinion from the Observation, that *Acids* provoke *Appetite*, is as much strain'd and fallacious as this. For though *Acids* may, by pricking and vellicating the *Stomach*, procure a Sense of *Hunger*, and perhaps, by mixing with, cutting, and precipitating that *Viscous Phlegm*, or Matter, with which the *Stomach* is sometimes overloaded, even to the *Prostration* of *Appetite*, may accidentally procure a better *Digestion*, as they scoure and cleanse the *Stomach*, yet that is no Proof that any such sort of *Menstruum* is necessary, and primarily employ'd by *Nature* in the Action of *Digestion*. For divers other things which are not manifestly *Acid*, and some that are even opposite to, and destructive of *Acids*, will sometimes do the same thing, as is notoriously known of the *Bitters*, especially to all *Practitioners* in *Physick*, and in some Cases, when judiciously apply'd, of the *Volatile Animal Salts*, and *Lixivial Vegetable* ones.

Acids im-
proper In-
struments
of Chyli-
fication.

But neither do *Acids* seem naturally fit to promote *Chylification*, or to produce a *Liquor*, which they are of themselves so prone

prone to Coagulate, as we daily see by those *Coagulations*, which the slightest *Acids* produce in *Milk*, which is nothing else but *Chyle* a little defæcated. For tho' *Milk* upon standing, will indeed turn Sower without any other mixture: Yet whenever it does so, Experience shews that the Form of the *mixture* is immediately destroy'd by it, and sufficiently demonstrates thereby that such a State of *Acidity* as these Men wou'd suppose, is utterly inconsistent with the Being of that Liquor. Neither do they shew us, that if they cou'd possibly consist together, there is in a *Humane* Body any *Matrix*, that shou'd produce and furnish this *Acid Menstruum* either in the *Stomach*, or any other Part.

The Sower Remains of CHYLE, which Acid Re-
 (after the Learned Dr. Glisson,) Dr. Willis, ^{mains of} Chyle not
 and so many others have taken up with ^{sufficient,}
 (for want of a better Expedient, that might ^{if existent.}
 have some Shew of a real Existence) to do
 the office of an *Acid Ferment*, or *Menstruum*
 to cut and divide by its Sharp, Corrosive
 Parts, the new ingested Aliment in the *Stomach*
 in so short a time, as *Digestion* is ordi-
 narily made in, is by no means an In-
 strument sufficient for the Purposes assign'd.
 For, besides, that it is a Question whether
 any part of the *Chylous* Mass does ever re-
 main behind *in statu sano* in the Folds of the
Stomach after *Chylification* compleat, and
 M exinan-

exinanition into the *Intestines*, it is still a farther Question, whether those Remains be naturally *Sowr* or not. *Autopsy* has never (that I know of) favour'd the Affirmative part of either of these Points; but has very often decided directly to the contrary, as I have frequently experienc'd in *Dogs*, which are as proper Subjects for such Tryals, as we can even desire. In these I have often expressly sought for these Remains of *Chyle*, but cou'd never see any signs of any such thing, nor tast any the least Degree of *Acidity* upon the *inner Coat* of the *Stomach*, tho' I made my tryals upon 'em, when their Appetites appear'd to be as keen as they cou'd possibly well be, and consequently this suppos'd *Vinegar* of the *Stomach* shou'd have been in its highest state of Exaltation. Neither wou'd any of 'em turn *Milk*, tho' I sometimes boil'd 'em in it, and at others kept it in them, as long as was reasonable to avoid making a fallacious Experiment.

Plicæ of
the Sto-
mach not
made to
detain any
part of the
Chyle.

Those that plead for these *Acescent Remains of Chyle* thought themselves sufficiently warranted by the *Plicæ* or Folds of the *inner Coat* of the *Stomach* to suppose a residue of some kind or other, and which they, supposing it to resemble *Milk* in that Property too, expected shou'd turn *Sower*. Not to insist here upon the Infirmary of Reasonings drawn from *final Causes*, or
from

from *Analogies* not sufficiently consider'd, both which are to be found in this *Hypothesis* of the *Acid Remains* of *Chyle*: It is easie to shew that the *Ruga* or *Plica* of the *inner Membrane* of the *Stomach* were not unnecessarily fram'd only to detain this Matter, which they dream of, but upon Mechanical necessity. For the *outer Tunic* of the *Stomach* being made *Fibrous* and *Contractile*, or *Dilatable*, according as the *Stomach* is empty or full, the *inner* must necessarily obey its Motions, and either shrink up, or dilate with it, or otherwise lie wrinkled or folded up, when the *Exterior* was not dilated. But this Contractility is not to be found in any *Glandulous* or *Villous Membranes*, and consequently that it might sometimes be dilated to all the Dimensions of the *Stomach* when full, and yet comply with all its Coarctation in its narrowest State of contraction (which Membranes of this Nature have no Power to do) it must be made to ply and fold as this Membrane does.

Mechanical necessity of those Plicæ.

Those that love *final* Reasons for such things may be satisfy'd to know, that it was by no means convenient that the *inner Coat* of the *Stomach* shou'd be endow'd with a Power of contraction like the *outward*. For all such *Contractile* Membranes are extremely *sensile*, which upon many Scores, it is not proper the inside of the

Use of that Structure.

Stomach of Animals shou'd be; since by its insensibility it is guarded against innumerable Provocations, which otherwise cou'd not be avoided; and does here to the sensible Parts of the *Stomach*, what the *Cuticula* does to the *Cutis*.

*Different
Effects of
Rennet,
and the
suppos'd
Remains
of Chyle
in the Sto-
mach.*

Indeed many of those, who have contended for an *Acid Ferment* in the *Stomach*, have been very sensible of the insufficiency of any such *Acid* as might be form'd out of the *Remains* of *Chyle*. And have look'd out for other means, notwithstanding the famous Instance of the *Rennet-bag*; whose Liquor being Salted, and Pickled, bears no Analogy to what was found in the *Calve's Stomach* before Pickling: Nor indeed are the Effects of the *Rennet* so made any thing like to what they ascribe to this *Menstruum*; for that coagulates, and this dissolves: This digests the *Milk*, which the *Calf* lives upon: And that destroys it, and renders it less fit for Nourishment than before.

*Meats
Pickled or
Salted
made hard-
er of Di-
gestion.*

All the Tryals that have been made by *Artificial Digestions* to dissolve *Flesh*, have been made with *Acids* of another Class and Nature, than *sowr Milk* or any of that low form of *Acids*, which they have found by Experience to preserve, not destroy it, as *Vinegar* and those *Salts* which abound with *Acids* do. Neither are those Meats so preserv'd, more obedient to the Faculties

ties of the *Stomach* for having been *Pickled*, or of better Nourishment, as they shou'd be, if they contain'd any thing congenial to the *Natural Ferment* of the *Stomach*: But on the contrary they become *harder* of *Digestion*, and of *less Nourishing Juice*.

Dr. *Havers* finding these *Acids* insufficient to dissolve and reduce *Flesh* to a *Pulp*, proposes an Experiment with *Oil of Vitriol*, which he says will do it. But being well aware of that obvious Objection, that it is morally impossible for the *Stomach* (without the utmost danger) to bear so *highly corrosive* an *Acid*, he proposes to qualify it by an *Oleaginous Mixture*, something like *Oil of Turpentine*. To illustrate this Notion, he puts *Raw Flesh*, *Crums of Bread*, *Oil of Turpentine*, and *Oil of Vitriol* together; and after shaking them well, commits them for four hours together to *Digestion* in *Balneo Mariae*; and then upon shaking his *Glass* again, he finds the *Meat* dissolv'd, and all together making up a thickish *Pulp*: From whence he concludes that the *Mens- And Hy-*
struum, which dissolves the *Aliment* in the *pothesis*.
Stomach, must be something of the Nature of the *Mixture* of those *two Oils*.

But (with all due regard to the Notions, *Deficient*
 and Experiments of so Ingenious a Man) *in many*
 he has been too hasty in drawing his Con- *Particu-*
 clusions, and should have register'd the *lars*.
 other *Phanomena* of his Experiment, before

he rais'd so large an *Hypothesis* upon so narrow a Bottom, as the seeming Agreement in one single Accident, *viz.* the *Reduction* of the *Meat* to a *Pulp*. He should have shewn that this *Pulp*, or the *Liquor* which it afforded, agreed perfectly in *Taste*, *Colour*, *Smell*, *Consistence*, and other Accidents with the *Chyme* or *Chyle*, that result from Animal Digestion. But, unless the *Liquor* which this *Mass* afforded, was such a *Sweet*, *Soft*, *White Inodorous Juice*, all the Demonstration his Experiment amounts to, is, that the *Oils* of *Vitriol* and *Turpentine* mix'd, will resolve and reduce *Flesh* to a *Pulp*, but will not make *Chyle*; which shews his Experiment something worse than unconvulsive, that is, it is conclusive against the Use he would make of it.

Not help'd
by his other
two Experi-
ments.

However the Doctor is so satisfy'd in the Sufficiency of his Experiment, that he proceeds to inquire how this *Fermentative Vitriolick Terebinthinate Mixture* is form'd in an *Human Body*, and imagines to find two divers sorts of *Liquors*, one *Acid*, and the other *Sulphureous*, separated from the *Salival Glands*, and mix'd in, or about the *Mouth*, which, though apt to ferment upon their first Mixture, are yet, perhaps, apt to do so more considerably when they come to be digested by the Heat of the *STOMACH*. And in this Opinion he fortifies himself with two other Experiments, which he made
after

after the same manner upon *Meat*, with Oil of *Vitriol* mix'd severally, one with a *Solution* of Salt of *Tartar*, the other with Oil of *Camphire*, which did not succeed so well as the Experiment with Oil of *Turpentine*: From whence he draws this particular Conclusion. * *And I do the rather think* one of those Juices which constitute the *Saliva*, to be of the Nature of Oil of *Turpentine*, than of a fix'd Salt, because it will correct and temper even Oil of *Vitriol*, so as to render it more tolerable to the Fibres of the Stomach. Not that I suppose the Acid part of the *Saliva* to come near to the Acidity of Oil of *Vitriol*. For though when they are mix'd, they will make a Liquor that may not be injurious to the Stomach: Yet that Acid Juice, if it were so corrosive as Oil of *Vitriol*, would certainly be injurious and painful to the *Salivatory Ducts*, which convey it to the Mouth before it is mix'd with the Oleaginous Liquor. But I only say it is an Acid, and in some degree approaches to the Nature of that Oil.

It is obvious for the Reader to discern, that this *Hypothesis* stands purely upon the Foot of the Experiment before mention'd, which has been shewn to be insufficient. But if it were not, nothing could make it certain, but the Actual Demonstration of the real Existence of such Liquors sincere, and apart in the Body, and their Conveyance together into the Stomach. For this

*Discourse concerning Concoction, read before the Royal Society by Dr. Havers, May 1699.

Precautions Foundation of this Hypothesis.

purpose the *Doctor* assigns two pair of the *Salival Glands* to the Separation of the *Acid Liquor*, and the other two Pair for that of the *Oil of Turpentine*, as distinctly as if he had really found, and examin'd them sufficiently apart, which is the more surprising, because it is in reality no hard matter to do it, and that Experience does constantly shew, that these *Glands* do not afford *Liquors* so much as sensibly distinguishable, and that the *Liquor* which they do afford, does not in the least resemble either *Oil of Vitriol*, or *Oil of Turpentine*, or any kind of *Acid* or *Volatile Essential Oil* whatsoever. Nor indeed does any part of the *Body* afford any such kind of *Substances* at any time, or by any *Trial* or *Analysis* whatsoever.

Acido-Sulphureous Menstrua, all obnoxious to the same Exceptions

The Objections, which lie against this *Hypothesis* and that before mention'd of the *sour Chyle*, reach all sorts of *Acido-Sulphureous Menstruums* in the *Stomach*. For, if they be *temperate* like the first, they will not be *corrosive* enough to procure a *Solution*: If they be not, but *exalted Acids*, they are lyable to the same Exceptions just now offer'd, and nothing resembling either of them, in either State, is to be found among all the *Animal Fluids*.

Alkalious or Alkalino-Sulphureous, a more plausible Invention;

Those that hold the *Menstruum* of the *Stomach* to be *Alkalious* or *Alkalino-Sulphureous*, are somewhat more countenanc'd in

in their Opinion, by the Substances which may be produced by the help of Fire from all sorts of *Animal Fluids*, all which yield *Volatile Alkalious Salts, Spirits, Phlegm, Oil, and Caput Mortuum*, differing only in proportion according to the different Mixture of the Liquor it is drawn from, whether that be *Urine, Blood, Bile*, or any other. But though all these Substances may be drawn from the *Natural Juices* of the Body, and may be allow'd to have pre-existed in them; yet it must be confess'd that all of them are in some Measure alter'd by the Fire, though that Alteration may, perhaps, be no more, than would result from any other *Resolution* of their Mixture. However, if any of them will, after this Separation, act so vigorously upon *Flesh*, as to dissolve it in such a *Heat*, as that of the *Stomach* may be granted to be, that Activity is certainly owing to the *Exaltation* which it had from the *Fire*. For no where in the Body, in its Natural State, do we find any *Salts* or *Sulphurs* so *exalted*, as to be capable of making such a *Dissolution*.

Animal
Substances
all yield
Volatile
Alkalies.

But not un-
alter'd by
the Fire,

Neither can I see (let this exalted *Salt* or *Sulphur* be convey'd by what ways or means soever, the *Patrons* of this Opinion will or can suppose) what hinders the *Menstruum* that so readily dissolves the *Aliment* from touching the *Stomach* it self, which is often-

oftentimes of the same, or slighter Texture, than even the Matter it self, which it digests: And one might as well expect, that *Aqua fortis* put upon pieces of *Iron*, in an *Iron Pot*, should dissolve the pieces of the Metal, without touching the Vessel, which is an Experiment, I doubt, no *Chymist* would be perswaded to try.

This Objection holds equally good against all sorts of Menstrua in the Stomach.

This Objection, indeed, holds good against all kinds of *Menstrua* in the *Stomach*, as *Digesters*, whether we suppose an *Acid*, or *Alkalious*, *Saline*, or *Sulphureous*, or however mix'd: For still the Matter to be wrought upon is the same, or of the same kind, with the Vessel in which it is to work. They therefore that will have a *Menstruum* to be the *Efficient Cause* of the *Dissolution* of the *Aliments* in the *Stomach*, are oblig'd to find something in the *Aliment* it self, before it comes into the *Stomach* (which must be a Condition the *Stomach* it self has not) that disposes it to receive the Impression of the *Menstruum*.

Saliva no proper Menstruum.

This some endeavour to find in the Impregnation of the *Aliment*, with *Saliva* by means of *Mastication*. But, if the *Saliva* were a Juice so very Acrimonious, it would be impossible for it never to offend the *Stomach*, especially considering the Quantities of it, that many swallow even upon an empty *Stomach*. However the ready *Digestion* that those Animals have, which do
not

not *Masticate* at all, but swallow their *Prey whole*, of which I have spoken at large in the beginning of this Chapter, demonstrates the Insufficiency of that Cause.

Whatsoever therefore this *Ferment* or *Menstruum*, or *Principle of Fermentation* is, that sets the *Wheels of Dissolution* so nimbly a going; it must be something *Internal*, and *Inherent* in the *Aliment* it self, which is an Opinion of ancient standing, but has been rejected for that of a *Menstruum*; because an Inward Cause, or Condition sufficient for this great Operation, was not so expressly, and by Name assign'd, as that speculative and curious Men might have wherewithal to satisfy their Inquiries, and judge for themselves of the Truth of the *Hypothesis*. However they that went thus far, though they did not clearly, and explicitly, discover all, did good Service to Truth, and had they, who rejected that Opinion, been as scrupulous about the Evidence of those others, which they took up in its stead, it is probable it had not lost ground, but that the *Latent Property*, upon which this grand *Phænomenon* depended, had long e'er now been brought to light.

In order, therefore, to discover what this great Secret is, which has been so long sought after, with so much Industry, and so little Success, it will be necessary to consider three things.

First,

First, What is the *State* or *Condition* of the ALIMENT, as *Nature's*, or *our own*, Preparation offers it to us, before it enters the MOUTH.

2dly, What *Changes* it undergoes in the MOUTH, before it reaches the STOMACH. And,

3dly, What it *suffers* in the STOMACH, in order to a thorough *Dissolution*.

Aliment
reducible
to two Ge-
neral

Heads. Of

which Two

States.

In their

First, or

Natural

State, sub-

ject to un-

avoidable

Dissolu-

tion.

Their Se-

cond a

State of

Actual

Decay.

Yet quick-

ened by the

Changes

wrought

upon them

in the

Mouth, &c.

These, at-

tended, to

show the

Reason of

the Variety

of Organs

for Animal

Digestion

First then, All those *Substances*, upon which any sorts of *Animals* feed, may be reduced to one of these two General Heads, either of ANIMAL or VEGE-
TABLE (for I know of no Creature that lives upon *Minerals*) which being *Sub-*stances of their own Nature perishable, or subject to decay, their *Dissolution* may be hastened or retarded by *Accidents*.

Secondly, All those *Substances*, before they come into the MOUTH, or at least as soon as they come into it, are depriv'd of their ANIMAL or VEGETATIVE Life, and consequently in a State of *Natural* Decay, the *Principles* or *Means* of which they carry along with them, which are only put into or hastened in their Action, by the *Changes* which they suffer in the Mouth or Stomach, &c.

From these things well attended to, we shall not only be able to observe the *Means* which *Nature* uses in the *Dissolution* of the Food in *Animal Stomachs*, but likewise of the

the great variety of Organs, which she has made for that purpose; at least, we may by Attention arrive at it for those of whose *Anatomy* and way of *Living* we know the *History*.

Of all these kinds, which are reckon'd perfect, the *Apparatus* for *Digestion* is most Simple in the CARNIVOROUS, (most of which will live upon Fruits likewise) in which their *Organs* are suited to their Dyet, which is the easiest of *Digestion*. For *Flesh*, *Fruits* and *Sallad Herbs* being the most succulent of all the kinds of *Food*, which any *Animals* naturally eat, they *Ferment* of themselves, and come to a *Digestive Solution* much more readily than *Grain* or *Seeds*, or any kind of *dry Vegetables*. The Reason of which has been already given in the Chapter of *Fermentation*.

Organs of Digestion why most Simple in Carnivorous Animals.

Men do however generally prepare those things, which they Eat, especially the *Flesh*, by divers kinds of *Dressing*: Whether this Custom was first introduc'd by Luxury or Necessity, is not a very Material Inquiry here: But, if by such *Dressing*, the parts of the Meat be render'd more loose, and less coherent, it becomes thereby of easier *Digestion* in the *Stomach*: If otherwise, as in *Pickles*, long Salted, and dry'd Meats, it becomes harder of *Digestion* for it, and generally of worse *Nourishment*.

What Dressing of Meat contributes to Digestion.

Of

Early
Fruits,
and

Of all the things that Men eat, the *Hortary* or *Summer Fruits* are of quickest *Solution*, if stript of their Rinds, because the Body of 'em is more soft and succulent, than that of other things we eat.

Sallad
Herbs,
why easier
of Digestion than

Next to these in point of quick *Solution* are the *Lactinia* or the *Succulent Sallad Herbs*, which abounding with Heterogeneous Juices easily Ferment with Heat.

Flesh:
Whence
Roasting
and Boiling,
&c.
introduc'd.

The last and longest of *Digestion*, of all the kinds of Foods that *CARNIVOROUS Animals* naturally seek, is *Flesh*, which tho' its Parts be both succulent, and soft, yet are neither so Juicy, nor so soft and loosely coherent, as either of these before mention'd. And perhaps, as well out of Necessity as Luxury, Observation at first taught Men by *Roasting*, and *Boiling*, and other kinds of *Dressing*, to loosen the *Compages*, and soften the Parts of what they were to eat. Yet many whole Countries, even to this Day, reject the whole *Art* of *Cookery*, and eat their Meat *Raw*: And for any thing we can see, as much to the Advantage of their Health and Vigour, and perhaps as much to their Luxury.

Grain,
why by
Men either
constantly
Ground
and Sifted,
or Softned
by Steeping.

Men do likewise eat *Grain*, and sometimes *Roots*: But these are always prepar'd when us'd as a constant sort of Dyet as Bread is by Grinding, Fermenting, and Baking, whereby the Substance of the *Grain* is not only broken very small, but the mixt *Mass* made

made of it afterwards, is occasioned to cohere very loosely, and to contain a great deal of *Air*, which contributes to its future Dissolution in the *Stomach*. We do indeed use Grain divers other ways, besides in *Bread*, *Pyes*, and *Puddings*, which have all something very Analogous in their Preparation; but then we Macerate and Soften the Grain by previous Boiling or Steeping, and reduce it something nearer a State of *Fluor*, than it is found in the *Craw* of *Fowls*, which does the same Office, but need not carry it so far as our Artificial Preparations do, because the *Gizzards* of *Fowls* being much stronger, and more Musculous, are consequently better able to grind it, especially by the assistance of those *little Stones*, or *Grains* of *Sand*, which they constantly swallow.

The INDIANS, many of 'em, use *Indian* *Roots* instead of *Grain* to make their *Bread* of. But then even the rudest of *Roots* made of them prepare it by some sort of *Maceration*, and *Fermentation*, previous to their Eating of it, that may reduce it to such a State as may give the *Stomach* least trouble in the Dissolution of it.

Those *Animals*, which are obliged by *Marmou-* Nature to live upon Food somewhat hard- *sets* *Squir-* er, than that of Men, yet have no *Inglu-* *rels*, &c. *comminute* *their Food* *with their* *Fore-teeth*. *Stomach*, (such as MARMOUSETS, SQUIR-

SQUIRRELS, Rats, Field Rats, and Mice, that eat hard *Wild Fruits, Nuts, Cheese, Roots, &c.*) are observ'd to nibble a long time with their *Incisores* or Fore-teeth (which in those Creatures are very long, strong, and sharp) till they have exceedingly comminuted the Matters they eat, which are generally too hard for *Mastication* in these small Animals, and therefore they answer that end by gnawing that exceeding small with their fore Teeth, which they wou'd not have Strength enough to break with *Grinders*.

Early
Fruits,
why ge-
nerally
thought to
be of very
bad Dige-
stion.

Some have deny'd the *Fructus Horarii* and *Lactinia* to be of easie Digestion, because they observe, that they frequently produce *Flatulencies, Gripings*, and other troublesome Symptoms. But this Objection springs from want of considering *Digestion, Chylification* and *Nutrition*, as distinct Operations, which they confounding together, call that *hard of Digestion*, which does not yield much *Chyle*, or prove good Nourishment. It is true indeed of many of these sorts of *Fruits* and *Herbs*, that they are apt to raise disorders in the *Stomach* and *Intestines*. But this Fault proceeds not from a difficulty to be digested, but from too great a promptitude to it, and from the *Fermentative* Disposition of the Juices, which they yield, which will not let them remain long enough in the *Stomach* and *Intestines* to be

be subacted or qualify'd by the mixture of other things there for good Chyle, and Nourishment. So that their *Crudity* or unalter'd Simplicity of appearance, when they come away, proceeds from an *over-hasty*, not too *sluggish* Solution in the *Stomach*.

This generally is the *State* and these the Conditions of *Human Food*, before it comes into the Mouth. That of *other Animals* generally undergoes no alteration, except it be that of *Domestick Animals*, which sometimes eat *dry Meat* (so call'd in contradistinction to that which is *Green*) which is harder of *Digestion*, than the other, but these are generally very great *Masticators*, whether they have but one simple Stomach as *Horses*, or four as the *Ruminants* have.

Quadrupeds, that eat Dry Meat, Great Masticators.

The *second State* of the *Aliment*, which we propos'd to consider, is that which is introduc'd in the *Mouth*, which depends almost wholly upon *Mastication*. It seems to have two ends: The first to bruise, and comminute the Mass, and render its Cohesion more lax, and thereby the separation more easie in the *Stomach*: The other is to mix, and, as it were, to incorporate it with the *Saliva*, and so render it more apt to Swell and Ferment in the *Stomach*. For all Liquors containing some *Air*, are apt to rarify more or less in Heat, according to the Proportion they contain of it. But in

Second State of the Aliment.

Wheretotending.

N

my

my opinion, the principal use of the *Saliva*, as well as of the *Juice* separated in the *Stomach*, is to facilitate the Mixture or Incorporation of the several Fluids of the Meat and Drink, after the Solution of the more solid part is accomplish'd, and to unite them under that *Lactescent Form* from which they are denominated *Chyle*.

Most Con-
spicuous in
Rumi-
nants.

The first
Stomach
or Rumen

This Alteration of the *Aliment* in the *Mouth*, is more considerable in, and necessary to *Ruminants*, and other *Animals* that feed upon dryer and harder *Food* than the *Carnivorous* do: And indeed, Mankind excepted, who enjoy it in no Proportion to them, it seems to be peculiar to that sort of Animals, and accordingly Nature has provided for it by a particular Organization, in giving them a *Plurality* of *Stomachs*; into the *first* of which, their Food is usually transmitted, without any other Alteration in the Mouth, than being a little rowl'd, and wrap'd up together. This first Stomach, which is call'd the *Rumen*, is the largest of them, probably to contain as well the Drink, as the whole crude Mass of their Aliment, which there liè and mace-rate together, and thence are transmitted again to the *Mouth*, to be *chew'd* and *commi-nuted* in order to their further *Digestion* in the other *Ventricles*, in which use it perfectly answers the *Ingluvies* of *Fowls*.

This

This Use is incomparably illustrated by the Structure of the *Rumen* or first Ventricle of *Camels*, in which are divers *Sacculi* that contain a considerable quantity of *Water*. This is an admirable Contrivance of *Providence*, to answer the Necessities of this *Animal*, which living in very dry desert Places, and feeding upon many sorts of hard dry Food, such as *Rice*, *Millet*, &c. would very often be in danger of Starving, even amidst the Plenty of *dry Meat*, which would not digest if they had not these *Reservatories* for *Water*, which oftentimes the Countries through which they march does not afford them in a long Tract of Ground. For if the *Water* which they drink, how large soever the quantity might be, were not kept apart in these Receptacles, it would pass off with the other Aliment upon the first discharge of the *Ventricle*, and they would not be able to sustain those long Journeys through dry Places, which all Accounts agree they do, for want of *digestible* Food.

Use of the
Rumen
illustrated
by its Struc-
ture in
Camels.

Use of the
Sacculi in
the Ru-
men of
Camels.

These are all the Alterations that occur to me to be made in the *Mouth*, after which the Food is transmitted directly to the *Stomach* to be digested. This Operation we have already deny'd to be perform'd by a *Menstruum*, either separated in the *Stomach*, or convey'd thither from elsewhere, or by *Attrition* or *Simple Heat*: Though

Third State
or Second
Stage of
the Ali-
ment.

we do not deny this latter to contribute to and promote *Digestion*, as it serves to actuate the Causes of Dissolution innate to the Aliment it self.

Principle
of Dissol-
ution,
what.

We suppose, then, all sorts of *Aliment* naturally to contain in them a *Principle* of *Dissolution* (if I may be allow'd to use that Term) which after the *Vital* and *Vegetative Faculty* is extinct, begins to exert it self to the Dissolution or Destruction of the Subject, and consequently the *State* of *Decay* may be reckon'd to commence, whensoever the Accession of new Matter, or shifting of the Fluids (which in Plants as well as Animals we call *Circulation*) is at an end, though it does not always immediately shew it self in Actual, Visible Corruption, but proceeds by various Steps or Degrees, according as the Fluids, or containing Solids, are more or less dispos'd to *Activity* or *Resistance*.

The same
with that
of Vege-
table Life

This *Principle* of *Corruption*, is perhaps the same, which in the State of *Circulation* and *Vegetation* was the *Principle* of *Life*, which being an *Active Principle*, and now deny'd that *Passage* or *Vent*, which it had before by the *Progressive* or *Circulatory Motion*, makes its way irregularly, and so destroys the Continuity of the *Solids* in which it is included, and introduces that Change in the Face of the whole Mass, which is call'd *Corruption*.

The

The *Active* Principle (I here mean) is the AIR, which is mix'd in considerable quantity with all sorts of *Fluids*, and is by Experience found as necessary to *Vegetable*, as *Animal* Life. This, (though it's Natural, or Essential Motion be Expansive, or *Quaquaversum*) being introduced into all Bodies, that have any kind of Life, mix'd with the *Fluids*, which make their Juices, has in them two kinds of Motion; one *Expansive*, by which it communicates that *Intestine* Motion, which all Juices have, and by which the containing parts are gradually extended, and grow; the other *Circulatory* or *Progressive*, which is not essential to it, but is occasion'd by the Renitency of the *Solid* parts of those Bodies, which obliges it to take that course which is most open and free, which is through the Vessels of *Animals* and *Plants*, which course being stop'd, the *Expansive* still remains, and continues to act, till by degrees it has so far overcome the Resistance of the including Bodies, as to bring it self to an equal Degree of Expansion with the External Air; which it cannot do without destroying the Texture and Continuity, or *Specifick* degree of Cohesion of those *Solids*, which is that which is call'd a *State of Corruption*.

For all Bodies, whether *Fluid* or *Solid*, that come within our certain Knowledge, are Specifically heavier, and consequently

Air that Principle

Has two sorts of Motion in Animal and Vegetable Bodies.

State of Corruption, what.

All mix'd Bodies

Specifically heavier than the Atmosphere.

of a closer Texture than the Atmosphere, and cannot be reduced to a *Par* with it, *Sine Interitu Subjecti*.

Corruption how accelerated.

This Expansive or Destructive Quality of the *AIR* in these Bodies, may be two ways actuated, or promoted, either by weakning the *Tone* or *Cohesion* of the Parts of the including Body, and so facilitating the Work of the *AIR*; as it happens when Fruit is bruised, which will corrupt in that part much sooner than in that which is sound; or by intending the *Expansive* force of the *Air* it self, by *Heat*, or other co-operating Circumstances, and so helping it to overcome the Resistance the sooner.

Digestion how perform'd.

Both these ways are used in many kinds of *Animal Digestion*: The first in Mastication, or the other *Analogous* already sufficiently spoken to: The Second by the *Heat* of the *Stomach*, which forcibly rarifying the *Air*, enables it to rend the including Bodies sooner to pieces, and so to let loose the *Fluids*, and perhaps likewise so far to comminute several parts of the *Solid*, as to make them sustainable in the *Liquor*; which latter is the Operation that compleats *Digestion* in the *Stomach*.

Not so soon dissolved by a Greater Heat of Culinary Fire.

It may perhaps be objected, that the same Substances which the *Stomach* resolves so quickly into Particles, do by every days Experience, bear a much greater Heat of *Culinary Fire*, and for a much longer time

time in the common Operations of *Cookery*, *Roasting*, *Boiling* and *Stewing*, than the *Stomach* requires to resolve them into *Minima*.

To this Objection I answer, that this Degree of Expedition depends in great Measure upon the *Medium* in which it is perform'd. Thus, in *Roasting*, Meat will bear a much greater Heat, than either in *Boiling* or *Stewing*, and the second way much fiercer and longer than in the latter: For as *Roasting* is perform'd in the open *Air*, as the Parts begin externally to warm, they extend and dilate, and so let out gradually part of the rarify'd included *Air*, by which means the Internal Succussions, on which this Dissolution depends, are very much weakned and abated. *Boiling* being perform'd in *Water*, the Pressure is greater, and consequently the Succussions to lift up the Weight, are proportionable in strength, and by this means the *Cottion* is hastned; and even in this way there are great differences; for the greater Weight of *Water* there is upon the Meat to be boil'd, the sooner it is done: And in *Stewing*, though the Heat be infinitely short of what is imploy'd in the other ways of Dressing, the Operation is yet much more quick, because it is perform'd in a pretty close Vessel, and full, by which means the *Succussions* are more often repeated, and more strongly reverberated.

The Expedition depends upon the Medium.

Roasting, Boiling, and Stewing, how differenc'd in point of Celerity.

How in
Papin's
Digestor.

These are the common Observations of
Cooks: But there is a way which yet more
exactly resembles the Operation of the
Stomach, which is by the *Digestor* invented
by *Monsieur Papin*. In this the Meat is
put together with so much Water as serves
exactly to fill the Engine, which done, the
Lid is screw'd on close, so as to admit of
no external Air; and is, with two or three
lighted Charcoal, or a single small Lamp
Flame, reduc'd to a perfect Pulp, or rather
a Liquor, in a very few Minutes, as in six,
eight, ten, twelve or sixteen, according to
the toughness of the Matter to be digested,
or the Augmentation of this little Fire,
which will, in a very short time, this way,
dissolve the hardest Bones themselves. The
strict closure of this Engine, so as to ex-
clude the Intervention, or escape of Air,
is the Occasion why the inward Succussions
of the contain'd Matter, being equable and
strong, resolve the whole into one seem-
ingly *Homogeneous* Body, and mix the *Aqueous*,
Saline, *Oleose*, and other Particles, so strongly
together, as not to be easily at least separ-
ated, but while hot, to appear one Li-
quor, and when cold, a uniform Gelly,
of a strength proportionate to the quan-
tity of *Flesh* or *Bones* dissolved in the
Water.

This

This Experiment holds great *Analogy* *Analogy between this Operation and the Digestion of the Stomach.* with the *Operation* of the *Stomach*, which though it does not ordinarily dissolve such hard Bodies, nor others so quick, yet according to the Degree of its Stricture, and the Proportion of its Heat, it may be said to do the same thing. For as the *Stomach* naturally closes upon the Aliments that descend into it; so it strictly embraces its Contents when full, and by keeping out any Extraneous *Air*, fortifies and invigorates the Succussions of that, which is naturally contain'd in the *Aliment*, which it receives: Which, however little it may be, is thereby enabled to break, and resolve into small Particles, the Bodies which included it so mix'd, *inter Minima*, with its Humours.

These, being thus reduc'd into *Fluor*, *Chylification, how perform'd.* and intimately mix'd with the Liquids of the Drink, and Juices of the Stomach, compose that *Laetefcent Liquor*, which is call'd *Chyle*, which is nothing but a Mixture of *Oily* and *Aqueous* Parts, incorporated together with the *Saline*, and which, while it remains mix'd with the grosser parts in the Stomach, make a *thick, whitish, partly fluid Mass*, which we call the *Chyme*, which as soon as it is reduc'd to a Consistence, loose enough to be obedient to the Pressure and *Peristaltick* Motion, is gradually work'd out through the *Pylorus* into the *Duodenum*,
along

Chyle,
how re-
ceiv'd into
the Lacte-
als.

along the sides of which, and the rest of the *Intestina tenuia*, the *Vasa lactea* are planted, into whose extremely minute Orifices, the thinner and more Fluid part of this Mass, is press'd by the natural Contraction, and *Peristaltick* Motion of the Guts, which is that *Chyle* of which the *Blood* is afterwards compos'd, and in Women that give Suck the *Milk* more immediately.

Appetite,
how rais'd.

When all the *Chyme* and *Chyle* is press'd out, the *Stomach*, which follows the Motions of its Contents, is again by means of its Muscular Coat, reduc'd to a State of Contraction, and by that means the Inner is brought to lie in Folds, which touching, and by means of the *Peristaltick* Motion, rubbing lightly upon one another, produce that gentle Sense of *Fretting* or *Vellication*, which we call *HUNGER*, which being felt first in the upper Orifice, which is first evacuated, begins therefore first to prompt us to replenish: But as by degrees the Remainder of the Contents are expell'd, this Friction or Rubbing of the Membranes upon each other, spreads gradually over the whole *Stomach*, and renders our *Hunger* more urgent and impatient, till by a new Repletion we take away the Cause.

This Hypothesis
not liable
to the Ob-
jections
which the
former are.

This is all the *Fermentation*, and all the *Menstruum* that are requir'd, to account for all the Natural *Phænomena* of *Hunger*, *Digestion*, and *Chylification*; and though they who

who admire Pompous Operose Proceedings, may think it too simple a piece of *Mechanism* for such great Effects, yet it is more sufficient than any of those magnificent Ways, which any of the most luxuriant Fancies have been yet able to invent, and is incumbred with none of those Inconveniencies which have attended all the *Hypotheses* by different *Menstrua*, and *Fermentations* that I have yet met with: For when any of those sharp provoking Liquors, which they have imagin'd have (as in Morbid Cases they sometimes do) affected the *Stomach*, the *Appetite* has been always vitious, and the *Digestion* bad. For in such cases the Repletion with wholesome Food, not being sufficient to take off the Acrimony of such Humours, the *Fancy* has been upon the Hunt, as Sick *Fancies* generally are, for something out of the way, and perhaps extravagant and hurtful; and when such Humours are sent in Plenty upon the *Stomach*, they are by the Heat of the Part rarify'd into those Flatulencies, which are vulgarly call'd *Wind*, which by distending the *Stomach*, hinder the Folds of the inward *Nervous Membrane* from approaching one another, and so destroy natural *Appetite*, as they do *Digestion* likewise, by hindering the *Stomach* from closing exactly upon the Aliments, and so obstructing it in its Office, which requires that Stricture,

Pricking
Humours
upon the
Stomach
a Disease.

Destroy
Appetite
and Dige-
stion.

The

Why hard
Drinking
does the
same.

The same way it is that hard Drinking destroys *Appetite* and *Digestion*: For by keeping the *Stomach* constantly distended with Liquor, the Tone of it is destroy'd, and till it can be recover'd again, they never return.

We might by the same way account for all the other Diseases of the *Stomach*, in which *Appetite* or *Digestion* are affected; but to do that, would take up more room than the Design of this Work allows, and this Chapter is already swell'd to too great a Bulk.

T A B,

Tab: II.

Fig: I.

Fig: II. ^{pag 109.}



T A B. II.

FIG. I.

THE Cavity of the *Abdomen*, after its *Muscles* and *Peritonaum* are remov'd, and the *Stomach*, *Intestines* and *Mesentery* taken out, to shew as many of the rest of its *Viscera in Situ* as could well be express'd in one View; the *Skin* and *Fat* being taken off; the *External Muscles* appear on the *Head*, *Arms*, *Breast* and *Thighs*.

A The Superior Convex surface of the *Liver*.

B Its Inferior Concave surface.

C The *Ligamentum Umbilicale* turned up on the Cartilaginous endings of the *Ribs*.

a, The *Gall-Bladder* fill'd with *Gall*.

b, The *Ductus Cysticus*.

c, The *Ductus Hepaticus* joyning with the *Cysticus*, and making the *Ductus Communis*.

d, A Probe inserted into the *Ductus Pancreaticus*.

e, Another Probe in the same Orifice or Caruncle in the *Duodenum* g; inserted into the *Ductus Communis Biliaris*.

f, The Body of the *Pancreas*.

g A Portion of the *Duodenum* opened, to shew the exit of the *Biliary* and *Pancreatick Ducts*, as above at d, e.

h The Emulgent Vessels of the left Side, under which, near the great Artery at l, lies the *Receptaculum Chyli*, express'd Fig. III.

i i The two *Kidnies*, of which the Right is somewhat lower than the Left.

k The *Spleen*.

l The

- l The descending Trunk of the *Great Artery*.
 m The ascending Trunk of the *Vena Cava*.
 n n The two *Spermatick Arteries* springing from the Trunk of the *Artery* at l.
 o o The Two *Spermatick Veins*, the *Right* emptying it self into the *Vena Cava*, m; the *Left*, into the *Emulgent Vein* h.
 p p The *Spermatick Veins* and *Arteries* passing on the *Psoas Muscles* towards the *Testes*.
 q q q The two *Ureters* descending from the *Kidnies* to r.
 r The *Bladder* of *Urin* here blow'd up.
 s The *Vrachus* turn'd down.
 t t The *Vasa Deferentia* passing from each *Testicle* to the *Vesicula Seminales*.
 u u The *Processes* of the *Peritoneum*, covering the *Spermatick Vessels* as they pass to the *Testes*.
 w w The *Testes*.
 † † The two *Cremaster Muscles*.
 ✕ ✕ The *Glandula Inguinales*.
 x x The *Spines* of the *Ossa Ilii*.
 y The *Os Pubis*, where the *Ligamentum Suspensorium Penis* springs, here express'd.
 z, The *Dorsum Penis*.
 D D The *Cartilaginous* endings of the *Ribs*.
 E E The *Boney* parts of the *Ribs*.
 * * The *Division* that is commonly made between the *Cartilaginous* and *Boney parts* of the *Ribs*, to raise the *Sternum* F G, in order to inspect the *Viscera* of the *Thorax*.
 F, The *Ensiform Cartilage*.
 G, The *Sternum* or *Os Pectoris*.
 H, Part of the *Clavicle* bared.
 I. The fore part of the *Os Hyoides*.
 K K, The *Glandula Maxilla inferioris*.
 L, The inferior edge of the lower *Jaw-bone* bared.

M, The

M, The *Os Jugale*.

N, The *Parotid Gland*.

O O, Parts of the *Musculus Serratus Major Anticus*, that are indented with the *Obliquus Descendens*.

P, The *Trunk* of the *Artery*, that is liable to be prick'd in letting Blood in the Arm.

Q, Part of the *Fascia Tendinosa* that springs from the *Musculus Biceps*, and passes over the *Artery P*.

R, The *Trunk* of the *Nerve* appears also at the Flexure of the *Cubit*.

S, The *Ligamentum Anulare*, or *Transversale Carpi*, by which the *Tendons* bending the *Fingers* are kept in, when their *Muscles* are in *Action*.

T, The *Tendon* of the *Musculus Membranosus*, near its *Insertion* to the *Tibia* and *Fibula*.

V V, The *Patella*.

W, The lower *Appendix* of the *Thigh-bone*.

X. The *Tibia*.

1. The *Musculus Orbicularis Palpebrarum*.

2. *Zygomaticus*.

3. *Buccinator*.

4. *Temporalis*.

5. *Masseter*.

6. Parts of the *Digastrick Muscles* at their terminations.

7. Part of the *Mylohyoideus* under the *Digastricks*.

8. Part of the *Coracohyoideus*.

9. *Sternohyoideus*.

10. 10. *Mastoides* on both sides.

11. A small Portion of the *Levator Scapulae*.

12. The *Pectoral Muscles*.

13. The *Deltoides*.

Ψ. Part

13. Part of the *Coracobrachialis*.
 14. The *Biceps Cubiti*.
 15. Part of the *Brachialis internus*.
 16. *Supinator Radii longus*.
 17. Part of the *Radialis Extensor Carpi*.
 18. *Radialis Flexor Carpi*.
 19. *Palmaris Longus*.
 20. *Flexor Digitorum perforatus*.
 21. *Ulnaris Flexor Carpi*.
 22. Part of the Tendons that extend the Thumb.
 23. *Abductor Pollicis*; adjacent to which, towards the Palm, lies the *Flexor secundi Offis Pollicis*.
 24. *Abductor Minimi Digiti*; on which at Δ is placed the
 (Δ) *Palmaris brevis*.
 25. The Expansion of the *palmaris longus* in the Palm.
 26. The Tendons that bend the Fingers.
 27. Part of the *Extensor Communis Digitorum* in the left Hand.
 28. *Abductor Pollicis ad Dorsum Manus*.
 29. The *Psoa Muscles*, over which the *Spermatick Vessels* and *Ureters* pass.
 30. *Musculus Iliacus internus*.
 31. *Sartorius* on both sides.
 32. *Musculus Communis Membranosus*.
 33. The *Gluteus Medius*, cover'd with the Tendinous Expansion of the *Gluteus Maximus*.
 34. *Rectus Femoris*.
 35. *Vastus externus*.
 36. *Triceps*.
 37. *Gracilis*.
 38. *Vastus internus*.

FIG.

F I G. II.

A Thin slice of the *Gall-Bladder* view'd with a Microscope, to shew its Membranous Structure, which is here distended and dry'd by blowing into its *Blood-Vessels*, whereby its *Parietes* became distended.

A A The external and internal Membrane.

B B Their Internal Membranous *Lamella*, framing a sort of Net-work by means of the *Air* insinuating into it. The like may be seen in the *Bladder* of *Urine*, or any Membranous part, if you insert a Blow-pipe between its *Lamella*, or force Wind into its *Blood-Vessels*. It is by the same means *Butchers* blow up their *Veal*, either by forcing their Wind under the Skin near the *Navel* of the Creature, they afterwards drive it over the whole Body; or by pricking the Skin between the Fore-Legs, they suddenly pull the Legs from each other, and so let in the external Air. This Practice, though forbidden, is commonly done in this City, insomuch that you can hardly meet with a Shoulder of *Veal* without *Inflation*.

F I G. III.

THE *Receptaculum Chyli*, and part of the *Ductus Thoracicus*, fill'd with *Mercury* and dry'd.

A A A Three Trunks of the *Receptaculum Chyli*: This Division of it, has not been taken notice of by Anatomists, which makes me suspect the Descriptions we have hitherto had of it, are from *Quadrupeds*, in whom, by reason
O of

of the Horizontal Position of this part, one *Receptacle* of *Chyle* may be sufficient. But in *Humane* Bodies, its Position being *Perpendicular*, it seems necessary this *Receptacle* should be thus divided, before it passes under the Trunk of the *Great Artery*, where it meets with repeated Compressions, by means of the Pulsation of the *Artery*, which drives up the Contents of the *Thoracick Duct*.

B One of the *Lacteal* Vessels ty'd up, by which the *Mercury* was injected.

C The internal Surface of the Left *Lumbal Gland*, that lay on the Trunk of the *Artery* below the *Emulgents*.

D The *Lympheducts* of the inferior Parts, before they empty themselves into the *Lumbal Gland* C.

E F. *Communicant* Branches of *Lympheducts*, between the *Right* and *Left Lumbal Glands*.

G The *Ductus Thoracicus* above the *Diaphragm*, where it lies between the descending Trunk of the *Great Artery*, and *Vertebra* of the *Thorax*.

H About this part of the *Duct*, its *Valves* are very *Conspicuous*, if you open it.

I. One of its Divisions (above which are divers others, that could not be express'd in this Page) whereby the Ascent of the *Chyle* may be the better carried on.

CHAP.

C H A P. XV.

Of the PANCREAS.

SYLLABUS.

Eorum quæ exhibet

Pancreas	{	Substantia	
		Color	
		Figura	
	{	Vasa	{ Arteria
			{ Vena
			{ Nervi
			{ Lymphaductus
	{	Ductus Wirtzungi cujus	Duplicitas
			Ostiola

THE PANCREAS is a conglomerate *pancreas.*
 Gland, situate near the first *Vertebra*
 of the *Loins*, at the bottom of the *Stomach* Tab. II.
 on the hinder part of it, adhering, at its Fig. I. f.
 thicker Extream, to the *Duodenum*, and from
 thence extended towards the *Spleen*.

It consists of innumerable small *Glands*, *its Sub-*
 which, though separately being very firm, *stance.*
 cohere but loosely together, and therefore
 make the whole Body of it seem lax. These
Glands are colligated as well by the *Vessels*,
 as by a *Membrane* proper to every one of
 them, and altogether are cloth'd with a
 very thin *Membrane* from the *Peritoneum*,
 which, if you blow into the *Excretory Duct*

of the *Pancreas*, will let out the *Air* at several places.

Colour. Its Colour is, what we in *English* usually call a *Flesh* Colour, *White* somewhat discolour'd with *Red*.

Figure. The *Figure* of it is somewhat like to that of a *Dogs Tongue*, but longer, being usually about eight or nine *Fingers* breadth long, and about two, or two and an half broad, and about one thick. Its weight, according to *Dr. Wharton* and *De Graaf* is about four or five *Ounces*.

Vessels. Its *Arteries* come from the *Celiac*, both *Right* and *Left*. Its *Veins* go the *Porta*. The *Nerves* come from the *Hepatic Plexus*, which is form'd under the *Liver* of some *Branches* of the *Intercostals*.

Excretory Duct. It has a *peculiar Duct*, first discover'd by *Wirtfungius*, and therefore call'd by his Name *Ductus Wirtfungianus*. This *Duct* is about the bigness of a *Ravens Quill* near the *Intestine*, though more slender in parts remoter from it. It is ordinarily accounted and described as a single *Duct*: But *De Graaf* takes notice, that he has seen it double sometimes in *Men*, and says, it is generally so in *Pheasants*, and many other *Fowls*: But it has hapned to be so in most if not all the *Humane Bodies*, and *Dogs*, that I have examin'd about it, since I took notice of that *Suggestion*.

Frequently double.

It

It empties it self into the *Duodenum* generally by two several Mouths: One only of which is taken notice of by Anatomists, and opens it self four or five Fingers breadth below the *Pylorus*; and not seldom at the same *Foramen* with the *Ductus Communis Choledochus*. The other is somewhat lower, but at an uncertain distance. It has no *Papilla*, and is much smaller than the other, but is easily discover'd by blowing into the Larger.

ostiola.

Tab. II.

Fig. I. d.

C H A P. XVI.

Of the SPLEEN.

SYLLABUS.

Partium & Notabilium

Vide
Tab. II.
Fig. I.

Lienis	{	Color
		Figura
		Situs
		Connexio
	{	Tunica { Exterior Communis
		{ Interior Propria—in qua Foramina
	{	Cellula
		Glandula—Malthigii
	{	Vasa { Arteria
		{ Vena
		{ Nervi
		{ Lymphatica

Spleen.

Colour.

Figure
uncertain,
as the
Number
also.

Vid. App.

Tab.

Blancard.

XXX.

Fig. 1.

Fig. 2.

THE SPLEEN is a soft spungy *Viscus*, appearing externally of a darkish discolour'd red, or rather blewish Colour. Its *Figure* somewhat approaching to that of a Tongue, though in that particular the appearance is not very constant, it being sometimes triangular, sometimes almost round. Perhaps Authors have generally describ'd its Figure from the *Spleen* of Brutes, which has in most of them a nearer resemblance to a Tongue, than the *Human* has. From such likewise the Figures of *Blancard*, here

here referr'd to, seem to be drawn. Neither is the Number absolutely certain, though generally we find but one, yet sometimes two, and sometimes three have been seen in the same subject, as divers *Anatomists* aver.

It is situated in the left *Hypochondrium*, Situation
between the *Spurious Ribs* and the *Stomach*:
A little Convex on the Surface towards the
former, and Concave next to the *Stomach*.

Its Magnitude is so very various, that
it is not precisely determinable: However, Magni-
the ordinary length assign'd is, about six tude.
Inches long, three broad, and one thick.

It is connected by the *Omentum*, and by
the means of that, and the *Blood-Vessels* to Connexi-
the *Stomach*, and *left Kidney*, and sometimes on.
the upper part of it adheres to the *Dia-
phragm*.

It is cover'd with two *Tunics*, of which
the External is deriv'd from the *Perito- Coats.*
neum, but naturally is so very thin, and
liable to tear in Dissection, as requires the
Anatomist to handle it very gently: In
some Morbid Bodies it is very firm and
thick, in others it becomes *Cartilaginous*
and *Boney*; it is joyn'd to the *inner* and
proper Membrane, only by the Intervention Exterior
of the *Blood-Vessels*, whence it happens, that, Coat.
upon the Separation of them, there appear
upon the Surface of the *inner Membrane*,
little black or bloody Points, shewing where
those *Vessels* were broken off: Through

these *Holes* or *Orifices* it is that the *Air* escapes, upon attempting to blow up the *Spleen* by the *Artery* or *Vein*, after this *outer Membrane* is separated from it; which Experiment generally succeeds in *Quadrupeds*, whilst this *Membrane* is left on. For if this *Membrane* be intire, when the *Spleen* is taken out, it may be blown up by any of its *Blood-Vessels*, or have its *Lymphatics* fill'd with *Mercury*, if all the *Vessels* be carefully tied, except those you blow, or pour into.

Interior
Coat.

The inner *Tunic* consists of *Fibres* very curiously interwoven, from which it sends over innumerable *Threads* from one side to the other.

Cells,

From this *Coat*, very probably, are deriv'd those innumerable *Cells*, or little *Bladders*, which make up the main Bulk of the *S P L E E N*. Though *Malpighius* rather thinks them to arise from the *Venous Duct*, a difference not very material. These *Cells* are for Number, Figure, and Magnitude, various and indeterminate, and best shewn by blowing up the *Spleen* through the *Trunk* of the *Vein*, and then laying a *Varnish* upon it, and drying it in the open *Air*, after which cutting it, the *Cells* remaining distended, shew their Figure and Capacity. These *Cells* communicate with one another, and exonerate themselves into the *Trunk* of the *Vein*.

How shewn

The

The inside of these Cells is furnish'd with divers Glands, according to *Malpighius*, ^{Glands of Malpighius.} which adhering to one another, six, seven, eight, or more together, form a sort of small *conglomerate Glands*, in which the *Arteries* and *Nerves* seem to terminate. Their Existence is however very questionable, as not appearing plainly here, nor in the *Penis* at all, whose Structure is the same, but by no Body said to be Glandulous.

Its *Arteries* come from a large Trunk of the *Cæliack*, and are contorted in their Progress to the *Spleen*: The *Veins* go to the left Branch of the *Porta*, and are call'd from the *Viscus*, the *Splenic Artery* and *Vein*. These Blood-Vessels are in respect to the Bulk of the *Viscus* very large, and manifestly communicate with each other. For whether you pour Water into the *Artery* or *Vein*, it presently discharges it self promiscuously by either; so that here is no sign of any *Valve*, nor indeed through the whole *Porta*, whatever some have told us.

Its *Nerves* come from the *Plexus*, call'd ^{Nerves.} by *Willis Plexus Lienaris*, which lies near the bottom of the *Stomach* on the left side. All these Vessels, as soon as they enter the *Spleen*, are wrapt up in one common *Cap-sula* or *Membrane*, and are plentifully distributed through the whole Substance of the *Spleen*, the *Nerves* every where accompanying the *Arteries*, and circling them variously

variously about. Of the *Vein* within the *Spleen*, there are divers Branches or Trunks, which on all sides, as well towards the Substance of the *Spleen* as the *Arteries*, are punch'd through with many little *Holes*.

Lympha-
ticks.

The *Spleen* abounds with *Lymphaducts*, in proportion to its Magnitude equally, if not more than any part of the Body: But these do not so plainly appear, unless in live Dissections, with a Ligature upon the Vessels, or on blowing into the Veins.

Easie Pre-
paration of
the Spleen
by Mer-
cury.

The *Anastomoses* between the *Arteries* and *Veins* of the *Spleen*, have been already observ'd to be more plain in this *Viscus*, than any other part of the Body; which will yet more fully appear, if *Mercury* be pour'd into either *Vein* or *Artery*. For it indifferently fills both from either; and if the *Spleen* be hung up so fill'd, with the Vessels tied for three Weeks, or a Month, and then cut, it exhibits them all in their proper Figures and Dimensions.

Spleen re-
ceives a
greater
Proportion
of Blood
than any
other part.

By the *Diameter* of the *Arteries* and *Veins* thus exhibited, as well as from the Capacity of the *Trunk* of the *Splenic Artery*, which equals that of both the *Mesenteric Arteries*, this *Viscus* appears to be evidently furnish'd with a greater Proportion of Blood, than any other in the Body.

Ingenious
Conjecture
of Mr.
Cowper,
concerning
the Use of
the Spleen

MR. COWPER from hence, and from the manifest immediate Communication between the *Arteries* and *Veins* in this Part, draws

draws a very Natural Conjecture at the Use of this *Viscus*, at least of this peculiar Mechanism. He imagines it to be a Subordinate Circulatory Organ, and that, by this Congress of the *Arterial* and *Venous* Blood here, an *Impetus* is communicated to the latter, by which its Progress through the Ramifications of the *Porta* to the *Cava* is promoted, which otherwise would be so broken by the double Ramifications of the *Porta*, as to want Strength sufficient to carry it to the Heart. This Hypothesis, deriv'd purely from the Mechanism of the Part, carries a Face of great Probability, and deserves to be consider'd by all the Learned and Judicious. But whether it be the *Sole* or *Ultimate Use* of the *Viscus*, I ask leave still to doubt.

Many other *Hypotheses* have been offer'd concerning the Use of this *Viscus*: But none of them so satisfactory to me, as to induce me to amuse the Reader about any of them, and therefore I shall leave it to farther Enquiry, intending my self to prosecute, at more leisure, some Suspicions which I have entertain'd concerning it, which I think not yet sufficiently confirm'd, to offer them to the Publick.

*Other Use
uncertain.*

C H A P. XVII.

Of the LIVER, GALL-BLADDER, and DUCTS.

SYLLABUS.

Eorum, quæ queruntur in

Hepate	Superficies	{ Convexa Concava
	Fissura	
	Figura	
	Magnitudo	
	Connexio per	{ Ligamenta Vasa
	Tunica	{ Communis Propria Lobulorum Peculiaris Glandularum
	Substantia	
	Lobuli	
	Glandula quarum	{ Figura Ductus Excretorii
	Ductus Cyst-Hepaticus	cujus Insertio Obliqua
	Forus Biliaris	cujus { Capsula Truncus Orificium
	Vesica Fellea	cujus { Connexio { Communis { Vasculosa Membrana { Propria { Musculosa Fundus { Glandulosa
	Meatus Cysticus	Collum
	Radices Felleæ	Sphincter
	Ductus Communis	Arteria—Hepatica
	Vasa Sanguifera	{ Vena— { Porta Cava
	Nervi	
	Lymphaductus	

Liver, its
Descrip-
tion.

THE LIVER is a large Glandulous Viscus, of a red bloodyish Colour, situated immediately under the Diaphragm in the right

right Hypochondrium, which it almost fills, ~~is~~ *its* ~~extension~~ and thence stretching it self over the right side of the Stomach, towards the left Hypochondrium, reaches beyond the Cartilago Eniformis, growing gradually thinner and narrower.

Tab. II.

Fig. I.

A. B.

The upper part of it is *Convex*, and perfectly smooth or polish'd: The under *Concave*, and somewhat more uneven, having four large *Fissures*, one through which the *Umbilical Ligament*, or Rope, passes, a Second on the left Side, receiving the *Pylorus*, and the beginning of the *Duodenum*, a Third on the right Side near the Margin, in which the *Gall-Bladder* is lodg'd; and the last in the upper part, affording a Passage to the *Vena Cava*.

Surface
Concave,
Convex.

Fissures.

The *Figure* of it is somewhat approaching to round, with thin edges, not altogether even but notch'd in some places. Its Magnitude is various in different Subjects, according to the Proportion of the Body, though in a *Fœtus*, or a very young Animal, it is always proportionably much larger than in Adults, in which *Dr. Glisson* reckons the ordinary length of it to be equal to that of the *Arm*, from the *Elbow* to the *Wrist*, measuring it by the *Concave* Surface, which is much the shortest, and differs from the *Convex* about as much as the String does from a Bow moderately bent. The same *Author* computes the

Figure.

Magni-
tude.

the Breadth to equal the Length of the Hand.

In some
Brutes di-
vided into
Lobes.

Sometimes
in Men.

Ccnnexion
by the

Ligamen-
tum Sus-
pensorium.

Two other
Liga-
ments.

And the
Blood-
Vessels.

In *Dogs* and divers other Animals, it is divided into several distinct *Lobes*; but in Men it is generally one continued Body, having one small Protuberance, which is accounted (by many) a little *Lobe*. Yet it has been sometimes observ'd to have been divided into two or three *Lobes*.

It is connected to divers Parts, but especially to the *Diaphragm*, to which it is fastned by a broad, thin, but strong Semi-circular Ligament, call'd its *Suspensory* Ligament, and deriv'd, according to *Dr. Glisson*, from the common *Capsula* of the *Porta* and *Gall Ducts*. The Continuity of this Ligament, being interrupted by the Perforation of the *Vena Cava*, has given occasion to some Anatomists to divide it into two. It is likewise by another strong *Ligament*, which has its Origine from the external Coat of the *Liver*, or, which is all one, from the *Peritoneum*, ty'd to the *Cartilago Xyphoides*. And by a third, which is form'd out of the *Umbilical* Vessels, which in Adults dry up and become a *Ligament*, it is connected to the Tendons of the *Abdominal* Muscles in the *Linea Alba* at the *Navel*. These several *Ligaments* serve to keep it in its due Situation, besides which, it has other Connexions by the Blood-Vessels, which need

need not be mentioned under this Head.

The Liver has a Motion, though not proper to it self, but depending on that of the *Diaphragm*, to which being so firmly connected, it must of necessity obey its Motion, and in *Expiration* be drawn up; and in *Inspiration*, when that is contracted, and approaches towards a Plane, be let down again.

It is cover'd with a thin smooth *Membrane*, deriv'd from the *Peritoneum*, which is to be separated from the Substance of the Liver, though not without some danger of Laceration.

Its Substance is *Vascular* and *Glandulous*, which latter part of it is very soft and fryable, and pretty easily scrap'd off from the *Vessels*, to which the *Glands* every where adhere as it were in Bunches; which has made Anatomists call the considerable ones the *Internal Lobes* of the *Liver*.

The *Glands* adhering thus to the *Vessels*, and constituting those *Lobes*, are wrap'd up together in *Proper Membranes*, whence this appearance of distinct *Lobes*. Every one of these *Glands*, according to the Observation of *Malpighius*, is composed of six unequal Sides or Faces, which are better to be seen in *Fishes*, and some other of those Animals, which are call'd *imperfect*, than in *Men* or *Animals* of a larger Kind.

These

*Peculiar
Membrane*

*Excretory
Ducts.*

*Porus Bi-
larius.*

*Cyst-He-
patic
Ducts.*

*First de-
scrib'd by
Dr. Glis-
son.*

These *Glands* are each of them cloath'd with their proper Membrane, and have each an Excretory Duct, several of which joyning together, form little Trunks, which run all along with the Branches of the *Porta*, and these again uniting, form larger Trunks, which are always found full of *Bile*, and make the *Porus Bilarius*, which being distributed all over the *Liver*, receives in the manner foregoing the *Bile*, which is separated by these Glands, and terminating in the *Meatus Hepaticus*, and that in the *Ductus Communis*, at length discharges the *Bile* into the *Duodenum*.

Besides this discharge, which is suppos'd to be the great one, it likewise delivers part of its *Bile* into the *Gall-Bladder*, by a Duct pretended to be discover'd first by *Monsieur Perrault*, and by him call'd *Ductus Cyst-hepaticus*, though long before describ'd by *Dr. Glisson*, but in one respect defectively, in that he does not take notice of any immediate Communication between the *Porus Bilarius* and the *Gall-Bladder*, by means of that Duct. *Verheyen*, according to the course of the *Bile* through that Duct, from the *Porus Bilarius*, reverses the former Name, and more properly calls it *Hepaticysticus*, and asserts the right of *Dr. Glisson* to the Discovery, which perhaps the Doctor had otherwise lost, for want of dignifying it

it with a distinct Name; for he barely calls it a *Trunk*.

The way to discover this Duct, is to tye the *Meatus Cysticus*, and then to blow strongly into the *Ductus Communis*, by which means the Air will come round by this Duct into the *Gall-Bladder*, which will be thereby blown up: And if afterwards the *Bladder*, and the *Meatus Cysticus*, from the Ligature upwards, be laid open, the *Blast* will be observ'd to penetrate not only into the *Bladder*, but likewise into the *Meatus* it self, by several little Apertures. This Experiment I have not yet had opportunity to try in a Man, but in an *Ox-Liver* it succeeded so, as to convince us, that even in an *Ox*, this Duct had not been sufficiently describ'd.

Verheyen, in the Prosecution of this Discovery, has observ'd in the *Gall-Bladder* of an *Ox*, not only one, but three Orifices opening into it, by blowing into each of which, the *Flatus* penetrated the *Ductus Hepaticus*, and offering to trace them, he found that two of them joyn'd together before they reach'd the *Hepatick Duct*, and enter'd into it with a single Stem and Orifice: The other he observ'd to be joyn'd just at its Orifice into the *Gall-Bladder* by another Duct, whose Roots were dispers'd through the Substance of the Liver. In another Subject the same Author says, He discover'd

App.
Tab.xxix
Fig. 4.
C C C.
H H H.
Experi-
ment dis-
covering
the Cyst-
Hepatic
Duct.

observa-
tions of
Verhey-
en, con-
cerning
this Duct.
Vid.App.
Tab.xxix
Fig.2. H.
k k. i i i.

ver'd four *Hepaticystick Ducts*, through each of which he blew into the *Gall-Bladder*. In farther Proof of this Discovery, he examin'd the *Gall-Bladder* of divers *Oxen*, and never fail'd of finding one or two such Orifices opening into the *Vesicula Fellis*.

Dr. Branthwait's
Experiment and
Discovery.

These Observations of this Inquisitive Anatomist, are confirm'd by an Experiment which was made before divers of us, by that Ingenious Learned Gentleman *Dr. Branthwait*, (when he prepar'd a Body for his Lecture on this *Viscus*, in the Theatre of the College, before the whole Society) who by blowing into the *Porus Biliaris*, after having open'd the *Gall-Bladder*, shew'd us the Wind issuing at a great many Orifices, which gives us occasion to think, that if these Ducts were carefully trac'd, they would be found to come from every considerable Branch of the *Porus Biliaris*.

One of
these
Ducts de-
scrib'd
from Ver-
heyen.

One of these *Ducts* the foremention'd curious Author, gives us a Description of, through the whole Tract of it, which, 'till Autopsy shall better inform us about the rest, may serve to give us an Idea of them all. It runs from the *Porus Biliaris* to the *Vesicula Fellis*, in length about eight Inches, and is about the thickness of a small Straw, but somewhat thicker near the *Gall-Bladder*, where it is joyn'd just at the Insertion by another Duct, the Roots of which are disseminated through the Substance of the Liver.

In

In its Course it receives divers *Tubuli*, or little *Gall-Ducts*, from the *Glands* of the *Liver*, most of which are inserted so as to point towards the *Vesicula Fellis*; though some about the Extremity nearest to the *Hepatick Duct*, point towards that, from which Contrivance the Author argues reasonably enough, that probably when the *Gall-Bladder* is so full, as not to admit of any more, they discharge themselves into the *Hepatick Duct*, though their ordinary Course be to the *Bladder*: Which is farther confirm'd by the Experiment of Blowing into the *Porus Bilarius*, which easily fills the *Gall-Bladder*, though the same *Flatus* cannot, by any Compression, be made to return that way to the *Porus Bilarius* again: Yet if the end of a *Blow-Pipe* be put into the *Orifice* at the *Bladder*, the *Flatus* pierces readily to the *Hepatick Duct*, which shews that the sole Obstacle is the *Oblique* Insertion, or *Valves*, of the Mouth of these *Ducts*; and that in the Channel, the *Flatus*, and consequently the *Bile*, moves indifferently either way.

This *Duct* is inserted obliquely into the *Vesicula Fellis*, and running a little way between its Membranes, discharges it self into it about three Inches above the Neck, after the same manner as the *Ureters* do into the *Urinary Bladder*. *oblique Insertion of this Duct.*

Porus Bi-
larius, or
Hepatic
Duct.

App.
Tab. xxix
Fig. 2.
a a a.
Capacity
of its
Branches.

Its Trunk.

Its Ori-
fice.

THE PORUS BILARIUS, or HEPATICK DUCT, which is the most considerable of all the *Biliary* Ducts, is form'd after the manner of a *Vein*, from the Concurrence of infinite small Ramifications springing from *Glands*, which united, make up divers Trunks, equal in Magnitude to the Branches of the *Hepatic Arteries*, which accompany them Branch for Branch, through the whole Substance of the *Liver*, and are wrapp'd up in the same *Capsula* with the *Porta*: These Branches are about the size of a Wheat-straw, but the largest of these are sometimes so stretch'd, as to be big enough to admit a Man's little Finger, and are distinguishable from the Ramifications of the *Porta*, chiefly by their Contents. Besides the *Capsula* which is common to that and the *Porta*, it has a thick *white Proper Coat*, like the *Musculous* one of an *Artery*. On the *Concave* side of the *Liver*, the several Ramifications meet and form one Trunk or Channel, which is call'd more peculiarly the *Hepatic Duct*, about the bigness of a *Goose-Quill*, which descending about two Inches, meets with the *Cystick Duct*, and together with it, forms that which is call'd the *Ductus Communis*, which descending in a right Line about four Inches, farther discharges it self into the *Duodenum*, by an oblique Insertion oftentimes at the same Aperture with the *Pancreatick Duct*. The

The GALL-BLADDER is a Membranous Receptacle, in Figure somewhat like a Pear, situated at the lower Margin of the Liver on the Concave side: It is about the bigness of a Pullets Egg. It adheres to the Liver, not only by its Vessels which it receives from it, but likewise by its Membranes, the External or Common being the same with that of the Liver, and is a good part of its Substance, as it were immers'd in the Liver: The lower part which hangs out of the Liver, rests upon the Pylorus of the Stomach or Colon, which it dyes Yellow by those parts of Gall which transude through its Membranes.

Gall-Bladder.
App.
Tab.xxix
Fig. 4.
E A.
Its Con-
nexion.

Its Membranes are reckon'd five, an outer or common one from the Peritoneum, an inner one on that side which adheres to the Liver from the Capsula of the Porta, and of the Porus Bilarius, besides three Proper.

Membranes.

The Exterior of the Proper Membranes, consists of a great Number of white Fibres, irregularly interwoven with a great Number of Vessels, upon the account of which it is call'd the VASCULOUS Coat.

Exterior,
or Vascu-
lous.

The Second consists of a sort of Fleshy Fibres of a double Order, and therefore it is call'd the MUSCULAR Coat. The first Order of these Fibres is Longitudinal, but somewhat irregularly disposed: The Second are Annular, but alike irregular with the

Second
Muscular

former, often intersecting one another, as the former do, at very acute Angles.

Third or
Inner
Glandul-
ous.

The *Third* or *Inner* Coat, which is very much wrinkled, consists of a great Number of *Glands*, like the *Crusta Villosa* of the *Stomach*, and is therefore properly call'd its *Glandulous Coat*: It separates a *Mucus*, which, lining all the inside of this *Bladder*, serves to defend it from the extream Acrimony of the *Bile*, which is in this part abundantly thinner, and much more Acrimonious, than in the *Porus Biliaris*.

Vide
Tab. II.
Fig. II.

Thus the *Tunics* of the *Gall-Bladder* are describ'd by some, who are Nice in distinguishing Membranes. But to us, assisted by the Microscope upon a piece of a *Gall-Bladder* dry'd, the reason of this accurate Distinction did not appear. But on the other hand, these several Orders of *Fibres*, before describ'd, seem'd to be only an infinite Perplexity of Vessels diversly ramify'd, with some *Fibres*, perhaps disorderly mix'd, which when the Subject is dry, are not easily to be distinguish'd.

Fundus.

Collum,

Sphincter

The *Bladder* has been divided into two parts, the *Fundus* or *Bottom*, and the *Collum* or *Neck*. At the Orifice of which latter is placed a *Ring*, or *Circle*, of pretty strong *Muscular Fibres*, which serve as a *Sphincter* to constringe the Orifice of the *Gall-Bladder*, and hinder the too liberal discharge of the *Bile*.

Just

Just below these *Fibres*, which by some have been mistaken for a *Valve*, is continu'd another *Biliary Duct*, call'd *Meatus Cysticus*, which is about the bigness of a *Goose-Quill*, and at about two Inches distance from the *Gall-Bladder* is joyn'd to the *Meatus Hepaticus*, which together form the *Ductus Communis* before mention'd.

Meatus
Cysticus.
App.
Tab. xxix
Fig. 4.
G G.

Besides these *Gall-Vessels*, which are peculiar to the *Liver*, it abounds with *Blood-Vessels*, especially *Veins*, of which the *Porta* and *Cava* are disseminated through the whole Substance of it: And here it is particularly remarkable of the *Porta*, that after the manner of *Arteries*, it shoots it self from a *Trunk* into *Branches*, and being at last lost in *Capillaries*, it delivers the Blood into the *Cava*, by which it is immediately re-convey'd to the *Heart*.

Vena
Porta con-
trary to
all other
Veins,
shoots from
a Trunk
into Bran-
ches like
an Artery
Ibid.
Fig. 2. B.
ccc.
Fig. 4. I.

The *Porta* is form'd out of the Concurrency of divers *Veins*, which meeting together make one of the most considerable *Venous Trunks* of the Body, as to its Bulk, though contrary to the Course of other *Veins*, it runs not far in a *Trunk*, but is, as before observ'd, soon distributed again, by *Ramifications*, into the *Liver*.

Trunk of
the Porta
but short.

According to the vulgar Method, we might divide this *Vein* into *Branches without the Liver*, and *Branches within*, and a *Trunk* intermediate. But being of Opinion, that this Method is not so clear as it ought

Vulgar Di-
vision of
the Porta,
why not
follow'd.

Branches
without
the Liver,
not proper-
ly so call'd.

to be, and the *Branches*, as they are call'd, *without* the *Liver*, are not so properly *Branches* as *Roots*, which have, by Anatomists, been dignify'd with distinct Names, from the Parts from whence they come. We shall not amuse the Reader with it, but proceed to enumerate those *Veins*, which conspire towards the Formation of this *Trunk*, which having been describ'd in their proper Places, or being to be describ'd there, we shall not enlarge upon their Descriptions here, but content our selves only to name them, with a short Hint from whence they come.

Veins
concurring
to form the
Trunk of
the Porta.

These are from the *Placenta Uterina*, in a *Fœtus* the *Vena Umbilicalis*, from the Gall-Bladder the *Cystica Gemella*, from the upper part of the Stomach the *Pylorica*, or *Gastrica dextra*, which goes to the *Trunk*: The *Gastrica Major*, and *Minor Sinistra* from the Stomach, (of which the Major is form'd out of the *Coronaria Ventriculi*) the *Epiplœis Sinistra*, and *Postica* from the *Omentum*, the *Gastroepiplœis* from the Stomach and *Omentum*, the *Vas*, or *Vasa Brevia*, from the Stomach; the *Splenica* from the Spleen, all joyn to form the *Left* or *Splenick Branch* of the *Porta*. The *Right*, call'd also the *Mesenterick Branch*, consists of the *Gastrica* and *Epiplœica dextra*, from the Stomach and *Omentum*, the *Duodena* from the *Duodenum* and *Jejunum*; the *Hæmorrhoidalis Interna*,
from

from the *Intestinum Rectum* and *Colon*; the *Mesaraicks* from the *Mesentery*: By means of all which recited Vessels, the *Porta* receives the Blood from most of the *Viscera* of the *Abdomen*, and, after the Coalescence of its Branches, enters the *Liver* in a *Trunk*, immediately under the Surface whereof, having first form'd a kind of *Sinus*, it is divided in two principal Branches, and those again into five, which scatter innumerable Ramifications through the whole Substance of the *Liver*. The several larger Branches, are together with the Branches of the *Porus Biliaris*, wrapp'd up in a common *Capsula*, or Membrane already describ'd.

The Blood which is convey'd into the *Liver* by the *Porta*, after the manner of the *Artery*, is receiv'd again, after having been purg'd of its Bile in the *Glands* of the *Liver*, into innumerable *Veins*, which empty themselves into the *Cava*, and are vulgarly, though improperly, call'd *Branches* of the *Cava*, but ought indeed to be esteem'd the proper Blood-Vessels of the *Liver*, as the *Emulgents* are of the *Kidnies*, and which do as all others, except the *Pulmonary Vein*, exonerate themselves into the *Cava*, the common Channel by which the Blood returns to the *Hearts*.

Branches
of the
Cava in
the Liver,
improperly
so call'd.

The

Hepatic
Arteries.

App.

Tab.xxix

Fig. 1.

I. L.

The *Arteries* which are call'd the *Hepatic*, come from the Right Branch of the *Cæliack*. The Learned *Dr. Glisson* thinks, that the *Porta* does so much the Office of an *Artery*, that no more are necessary than *those only which Minister Nourishment to the Membranes and Capsula*: Though I cannot but think that they serve for the Nourishment of the whole Part, and perhaps for other Uses.

General
Mistake of
Anato-
mists con-
cerning
these Ar-
teries.

Anatomists, having generally form'd their Idea's of the *Hepatic Arteries*, from the Dissection of the *Livers* of *Quadrupeds*, (especially *Horses* and *Oxen*) have represented them much less, than really they are in *Human* Bodies, because they have found them so in those Subjects, and have concluded them proportionally less in *Human*; whereas they are in Fact much bigger, as appears by several Preparations, which are to be seen at *Mr. Comper's*, in which the Stem of each *Hepatic Artery* is as large as a Goose-Quill, and the Branches in the *Liver* are every where equal in Magnitude to those of the *Porus Biliaris*, which they accompany. Perhaps in *Human* Bodies in this *Viscus* a larger *Stream*, and directer *Impetus* of *Arterious* Blood is requir'd to drive on the *Venous*, because of the *Erect* Posture then in Animals of a *Horizontal* Position of Body. For which reason *Horses*, &c.

Why larger
in Human
Bodies,
than in
Horses,
and great-
er Ani-
mals.

&c. though of much larger Size, and having much bigger *Livers*, have these *Arteries* much smaller than *Men*, and not only so, but curl'd like the *Tendrils* of a *Vine*, to break the *Impetus*, which in that *Posture* is not so necessary as in the *Erect*.

These sorts of Differences in the Mechanism of *Animals*, upon the Score of the Position of their Bodies, occur so often, that it would be no mean Service to *Anatomy*, and the *Oeconomical History* of *Animals*, if any one, who had Opportunity, and Ability, would give us a History of those Variations of the Parts of *Animals*, which spring from the different Postures of their Bodies.

Desideratum in
Anatomy

The *Nerves* come from the *Plexus*, call'd *Nerves*. by Dr. *Willis* the *Hepatick Plexus*, form'd on the right *Hypochondrium* by the Branches of the *Intercostal*, which wrapping themselves about the *Arteries*, make a sort of a Net-work, and after spreading themselves upon the Membrane and Surface disappear.

The *Lymphaducts* are numerous, but not easily observ'd in a *Human Subject*, for want of Live Dissections, or at least whilst the Subject is warm; but in other *Animals*, which may be dissected alive, if a *Ligature* be laid upon the *Porta* and the

Lymphæ-
ducts.
App.
Tab. xxix
Fig. 1.
Q Q.
R R.

Ibid. P

the *Biliary Ducts*, they become very conspicuous. But, by blowing into the *Arteries* or *Gall-Ducts*, they may be made visible, and appear very numerous on the *Concave Surface* of the *Liver*, where they run to a *Lymphatick Gland*, from which the *Exporting Lymphaducts* arise, and empty themselves into the *Receptaculum Chyli*.

C H A P.

Muscle on that side, only the *Right* is somewhat lower in Men than the *Left*: Though in *Brutes* it is generally the contrary. It is in *Figure* pretty like a *Bean*, but not quite so flat. They are in Men commonly about five Inches long, and three broad, and about one and an half thick.

Figure.

Magnitude.

Exterior
or Adipose
Membrane.

They lye between the Duplication of the *Peritoneum*, which affords them their *Exterior Membrane*, which in Persons not emaciated, generally abounds with *Fat*; whence it has by some been call'd *Tunica Adiposa*. This Membrane envelops them but loosely, and in *Fat* Persons is swell'd by the *Fat* to a very considerable thickness; but not so much as in *Quadrupeds*, because the *Horizontal Position* of their Bodies, leaves a greater space between their *Intestines*, and these Parts in which their *Fat* abounds.

Interior
Membrane.

The *Interior Membrane* arises from the *Exterior* of the *Blood-Vessels*, and adheres pretty closely, yet not so as not to be easily separable.

Connexion

By their external Membrane, they are connected to the *Loins* by their *Blood-Vessels* to the *Aorta* and *Cava*, and by the *Ureters* to the *Bladder of Urine*: The *Right* is likewise sometimes connected to the *Intestinum Cæcum*, and sometimes to the *Liver*; the *Left* to the *Colon* and *Spleen*.

The

The *Substance* of them is made up of *Glands* and *Vessels* of several kinds, the *Exterior* part of which, carries a very different Face from the *Interior*: The *Exterior* consisting mostly of *Glands*, and very fine *Ramifications* of the *Blood-Vessels*, which latter shooting their *Branches* round, like *Lines* drawn from a *Centre*, form divers little elegant *Star-like Figures*, which cutting the *Kidney* longitudinally, shew themselves very readily. This part of the *Substance* is in colour reddish, and is about a third part of the depth of the *Kidney*.

Next within these, appear a Number of small *Urinary Vessels*, which look like pale fleshy *Fibres*, which joyning together, make the *Carunculae Papillares*, which are only a Bundle or Collection of these little *Urinary Pipes*, and these again end in short *Tubulous Bodies*, or larger *Pipes*, answering to the Number of the *Papilla*, which are usually twelve, and are call'd *Fistulae Membranacea*, being only Productions of the Membranous Cell, call'd, the *Pelvis*, which is a Cavity in the Concave part of the *Kidney*, possess'd by a Dilatation of the *Ureter*.

The *Ureters* are long round *Membranaceous Pipes*, protended from the *Kidnies* to the *Bladder*, for the conveyance of the *Urine*.

They run with an Inflexion somewhat resembling the Letter S, and are obliquely inserted

Exterior
Substance

Interior.

Papillæ.

App.

Tab. xxxi

Fig. 2.

Sinus or

Pelvis.

Ureters.

Tab. II.

Fig. I.

999

Their
Course and
Insertion.

inserted into the *Bladder* near the *Neck*, after having run some space betwixt the *Membranes*.

Their Magnitude.

They are ordinarily about the bigness of a *Ducks Quill*, though in *Calculous Cases* they are sometimes distended to a much greater Size.

Blood-Vessels.

They receive *Arteries* from, and return *Veins* to the Trunks of the *Aorta* and *Cava*, and *Nerves* from the *Intercostals*, and from the *Medulla Lumbaris*, by means of which, they are rendred extreamly sensible, and though distendable, as we have said, to a vast degree, yet not without excessive Pain.

Emulgents

Tab. II.
Fig. I. h.

Their Distribution in the Kidnies.

The *Kidnies* have *Arteries* and *Veins*, which are call'd by one common Name *Emulgents*, and are usually but one of a sort to each Kidney, though they have been observ'd sometimes to vary in their Number. The *Emulgent Arteries* spring from the *Aorta* by a single Root, but usually at the entrance into the *Kidnies*, divide themselves into two Branches, and those again into divers others, the several Ramifications of which, are distributed into all the *Glands*, which make the Cortical part of the *Kidnies*, and which in *young Children*, and some *Brutes*, especially in *Hogs*, are congregated into Bunches like distinct *Lobes*, as those in the *Lungs* are, which inequality is visible on the Surface, but disappears

disappears by Age and Time, which level and render them smooth in *Men*.

From the Blood convey'd by these *Ar- Secretion teries*, the *Urine* is separated by the *Glands* of *Urine*, into the *Ducts*, or *Papilla*, and *Fistula Membranacea* before mention'd, and thence through the *Pelvis* and *Ureters* into the *Bladder*. After the *Secretion* of *Urine*, the Blood is return'd by the *Emulgent Veins* to the *Cava*.

Besides these Blood-Vessels, there is a *Adipose Peculiar Artery and Vein* which serve the *Exterior Membrane* of the *Kidnies*, and are by a distinct Name call'd, the *Adipose Artery, and Vein*.

The *Nerves* of the *Kidnies* come from *Nerves*, the *Plexus* of each side, call'd the *Plexus Renalis*, which is form'd out of the Branches of the *Intercostal*, and *Medulla Spinalis*. The Twigs of which twine pretty thick about the *Emulgents*, especially the *Artery*.

There are *Lymphaticks* belonging to the *Lymphaticks*, *Kidnies*, which in *Brutes* are observ'd to exonerate themselves into *Pecquets Receptacle*, but *Humane* Subjects are examin'd too long after Death, for them to appear so plain, yet if you blow into the *Arteries, Veins*, or *Ureter*, the rest being tyed, you'll see the *Lymphaducts* distended.

Between the Trunks of the *Aorta* and *Glandula Cava*, and the *Kidnies* a little above the *Emulgents*, are situated two *Glands* of an *irregular* *Glandula Renales, or Renes Succenturiatis*

Q

Vessels.

irregular uncertain Figure, call'd, *Glandula Renales*, *Capsula Atrabilaria*, *Renes Succenturiati*, which in a *Fœtus* almost equal the *Kidnies* themselves in Magnitude, but gradually shrink, till in *Adult* Persons they come to be very inconsiderable. They have their *Blood-Vessels* sometimes from the Neighbouring Trunks, and sometimes from the *Emulgents* and *Nerves* from the *Plexus Renalis*. They have a Cavity which is usually fill'd with a blackish Liquor, but no proper Excretory Duct having been yet discover'd, we remain in the Dark as to the use of these *Glands*.

C H A P.

C H A P. XIX.

Of the URINARY BLADDER and
URETHRA.

SYLLABUS.

Eorum quæ conspiciantur circa

Vesicam Urinariam	Situs	
	Figura	Communis seu Membranosa
	Tunica	Media seu Musculosa
	Connexio	Interior seu Nervea, & Glandulosa
	Insertio Ureterum	
	Vasa	Arteria
		Vene
		Nervi
	Sphincter	
	Urethra.	

THE URINARY BLADDER, the Re-
ceptacle of Urine, is situated in the
Pelvis of the *Abdomen* in *Men*, immediately
upon the *Intestinum Rectum*; in *Women*,
upon the *Vagina Uteri*, which lyes betwixt
them. Its Figure in *Quadrupeds*, resembles
a Pear with the Basis upwards, but in *Hu-*
man Bodies the lower part is almost upon
the Level with the upper, and its Orifice,
or *Neck*, lyes side-ways, while the *Fundus*,
or Bottom, (as it is call'd) which in a *Hu-*
man

Vide
Tab. II.
Fig. I. r.

Fundus,
or broad
part.

man Bladder is very broad, rests upon the *Rectum*, or *Vagina Uteri*.

Mem-
branes or
Coats.

Tab. III.
h.

It consists of three *Membranes*, the outward of which, or *Common Membrane*, is deriv'd from the *Peritoneum*: The *Middle* one, which is call'd the *Musculous Coat*, is compos'd of fleshy *Fibres* running longitudinally, which are intersected by others, irregularly dispos'd a-cross them. The *Third* is said to be *Nervous*, and has a great number of *Glands* under it, which separate a *Mucous Matter*, to defend it from the *Acrimony* of the *Urine*, which otherwise might offend it, being extreamly sensible.

It is capable of being extended to a great degree, and consequently the *External Dimensions* of it are lyable to great *Alterations*.

Connexion.

It is ty'd to the *Peritoneum* and *Navel* by the *Urachus*, which, after *Birth*, serves only as a *Ligament*. The *Neck* of it in *Men*, adheres firmly to the *Rectum*, and in *Women* to the *Vagina Uteri*, and before to the *Ossa Pubis*, by means of the *Peritoneum*.

Perforations for
the Ureters.

It is pierced by the *Ureters*, two or three Inches above the *Neck*, which as we have already observ'd, are very obliquely inserted, to hinder the return of the *Urine*.

Sphincter

At the *Exit* of the *Bladder*, to prevent the perpetual *Dripping* of *Urine*, is plac'd a *Muscle*, consisting of *Circular Fibres*, which is call'd the *Sphincter Vesicae*. This *Muscle* keeps

keeps the *Bladder* constantly shut, and is only open'd when, by the Contraction of the *Abdominal Muscles*, the *Bladder* is compress'd, and the *Urine* forc'd out.

Adjoyning to the *Neck* of the *Bladder* is the *Urethra*, which is the Excretory Pipe, or Tube, for the *Urine* to pass through; which is much shorter in *Women* than in *Men*, and much wider, and capable of greater Distention, as the Operation of Extracting *Stones* by *Dilatation* proves.

The *Bladder* and *Urethra* have *Veins* and *Arteries* from the *Epigastricks* and *Iliacks*, and in *Women* from the *Spermaticks* likewise, and *Nerves* from two *Plexus* in the *Pelvis* of the *Abdomen*, form'd out of Branches of the *Par Vagum*, and the *Nerves* of the *Os Sacrum* united.

There are three pretty notable *Glands*, discover'd not long since by Mr. *Cowper*, whose *Excretory Ducts* terminate in the *Urethra*, and which are situate not far behind its Membrane. But these relating, in their Use, rather to the Parts of *Generation*, than to the *Urinary*, they shall be describ'd with the *Penis*.

C H A P. XX.

Of the Parts of Generation proper to Men.

Vide
App. Tab.
xxxii &
xxxiii.

Under this Head of the GENITAL Parts of Men, are included, as Principal of this Chapter, *The SPERMATICK Vessels, The TESTICLES, The PARASTATÆ, The VASA DEFERENTIA, The VESICULÆ SEMINALES, The PROSTATES, and The SCROTUM.*

SYLLABUS.

Maxime Notabilium circa

T H E

THE SPERMATICK *Vessels*, other- Vasa Præ-
wise call'd, VASA PRÆPA- parantia.
RANTIA, are *two Arteries* and *two Veins*,
though in these Vessels Nature does not
always observe the same Rule, varying
often their Number, Origination, and In-
sertion; but most commonly they hold that
Number.

The *Spermatick Arteries* ordinarily arise from the fore-part of the Trunk of the *Aorta*, about two Inches below the Emul-
gents. Sperma-
tick Ar-
teries.

The Structure of these *Arteries* is very Singular: For, contrary to the Course of all other *Arteries*, which are largest at their Peculiar
Structure
of these
Arteries.
Exit from the Trunk whence they part, and grow gradually less in their Course, these are less in their Origin from the *Aorta*, App. Tab.
xxxii.
Fig. 1.
than in their Progress towards the *Testes*. By this Stricture at their Orifice, the Blood receives a Check at its first going off for these Parts, whereby its *Impetus* and *Velocity* are abated. The same End is answer'd by a different Mechanism in *Quadrupeds*, whose *Spermatick Arteries* are curl'd and contorted in their Passage like a Screw. For which different Methods of doing the same thing, * Mr. Cowper gives a Reason, which seems to me beyond Exception just; * Phil.
Trans.
No. 280.
P. 1180.
(viz.) ' That if the *Human Spermatick Ar-*

teries were contorted, as in *Quadrupeds*,
 the Apertures in the *Abdominal* Muscles
 of Men, must be much larger than now
 they are, and would frequently let the
Intestines descend into the *Scrotum*; an
 Accident, which, however, often happens.
 To such *Ruptures* (as they are call'd)
Quadrupeds are not so liable, though the
 Passages for the *Spermatick* Vessels be much
 wider in them than in Men; because the
 Position of the Trunks of their Bodies
 being *Horizontal*, their *Intestines* cannot
 press on the Processes of the *Peritoneum*,
 as in Men whose Posture is *Erect*.

Their
 Course.

These *Arteries*, immediately after their
 meeting with the *Spermatick Veins*, enter
 together with them, the *inner Lamella* of
 the *Peritoneum*, which affords them a *Coat*,
 wrapp'd up in which they run along the
Psoa Muscles, till they reach the *Processus*
 of the *Peritoneum*, bestowing some Branches
 in their Passage upon the *Peritoneum*. Here
 insinuating themselves into the *Duplicature*
 of the *Processus*, and being streightly cloth'd
 with it, they pass the *Foramina* of the
 Oblique and Transverse Muscles of the *Ab-*
domen, and at about three or four Fingers
 breadth from the *Testicles*, are divided into
 two unequal Branches, the bigger of which
 goes to the *Testicle* it self, where, after
 having enter'd the Substance of it, it is
 split

Ib. N.
 And Divi-
 sion.

Ib. O.

split into an abundance of *Ramifications*, dispos'd like the Tendrils of Vines, which are dispers'd all through it. The lesser Ib. P. descends to the *Parastata* or *Epididymis*, and is there distributed as the other is, in the *Testicle*.

The *Processus* of the *Peritoneum* embraces these Vessels very closely, and together with them, exactly fills up the *Perforations* of the Muscles, and so prevents the falling through of the *Intestines*, to which the erect Posture might render them obnoxious if they were wider, as in Dogs, and some other Animals they are, whose *Horizontal* Posture does not expose them to that danger.

The *Spermatick Veins* take the same course with the *Arteries*, but a little above the *Testicles* they split into several Branches, which unite again several times, forming thereby that sort of *Plexus* call'd, *Corpus Varicosum Pampiniforme*, or *Pyramidale*. The Blood return'd by these *Veins*, is deliver'd on the right side to the *Cava*, a little above the *Exit* of the *Artery* from the *Aorta*, and on the left side into the *Emulgent Vein*, to avoid crossing the *Great Artery*, in its passage over which, the Blood might be stop'd by the Pulsation of the subjacent *Artery*, or perhaps the *Vein* it self be broken. In these *Veins* are divers *Valves*, as well in the Parts nearer to the *Testicle*, as

Sperma-
tick
Veins.

Corpus
Varico-
sum Pam-
piniforme

Valves.

Ib. dddd
at

at their *Exit* into the *Cava*, and left *Emulgent*.

Nerves.

Along with these Vessels on each side, go two Branches of *Nerves*, one from the *Plexus* of the *Pelvis*, form'd out of the Branches of the *Intercostals*: The other from the second Pair of the *Vertebra* of the *Loins*, which latter however is very often not found.

Testicles.

The *Testicles* are soft white Bodies, usually in Number two, though some have naturally had *three*, and others but *one*; Their Figure is *Oval*, and their size about the bigness of a small Pullet's or large Pigeon's Egg. They have been thought to have been of a *Glandulous* Substance, and according to the present prevailing Notion of the Structure of *Glands*, they may be allow'd to be so still, notwithstanding the discovery of that Inquisitive *Anatomist* Dr. De Graaf, who finds them to be nothing but a Convolution of Vessels of divers kinds, whereof the principal are the *Blood-Vessels* before describ'd, of which the *Arteries* bring the Blood from whence the *Seed* is to be separated, and the *Veins* return it after that Separation made: The rest of the *Testicle*, which is much the greater part, is made up of *Seed-Vessels*, which are indeed but one continued Series or Rope intricately convoluted, and wound up as it were into a Bottom, but adhering so laxly, that they are easily drawn out into

Their Substance.

into length, and, in *Rats*, shaken from their close Contexture, by first separating the *Tunica Albuginea*, and putting the *Testicle* into Water, and then agitating it lightly, these *Seminal Tubuli* will be very manifestly disjoyn'd.

How unravell'd in Rats. App. Tab xxxiii. Fig. 2.

Some have fancy'd *Glands* to be necessarily interspers'd for the Separation of the Seed: But no Man has been able yet to demonstrate them, nor does the Necessity appear, if we suppose, as at present many do, that all *Glands* are but a Convolution of the Sanguineous and Excretory Vessels, though in other Parts their Texture] be not so loose, nor their Excretory *Tubules* so conspicuous.

No interspers'd Glands to be found.

These *Seminal Tubuli*, or Vessels, terminate in the *PARASTATES* or *EPIDIDYMIDÆ*, which are *tuberous varicose Bodies*, lying upon, and adhering, to the upper part of the *TESTES*, of which they seem properly a part, tho' of a different Form and Consistence. For tho' the *Parastatæ* be only a various Convolution of the *Seminal Tubuli*, mix'd with the *Blood-Vessels*, as the *Testicles* themselves are, yet here those *Tubuli* being united into one, the various Convolutions of which, being more firmly bound together by a strong Membrane, arising from the *Tunica Albuginea*, the Body of it feels more compact.

The Epididymidæ Ib. Fig. 1.

The

Proper
Coats.

Muscu-
losa.

The *Testicles* and *Parastates* are said to be inclos'd in three *proper Membranes*. It is pretended the first is deriv'd from the *Cremaster Muscle*, which we take to be a needless Multiplication of *Membranes*, all *Muscles*, like this, having their *proper Membrane*, which is all that is meant herein. This *Cremaster Muscle* presenting it self, must be removed before the *proper Membrane* of this part can be seen: It springs fleshy from the Spine of the *Os Ilium*, and in its descent expands it self on the Surface of the *Tunica Vaginalis*, to which it firmly adheres.

Vaginalis

Albugi-
nea.

The *Tunica Elytroides*, or *Vaginalis*, is a Continuation of the external *Lamina* of the *Peritoneum*, and is liable to be divided into several *Membranes*, which some Anatomists please themselves with. It incloses the whole *Testicle*. The third Coat is the *Albuginea*, so call'd from its colour, which is white. It is a strong thick *Membrane*, very smooth on the outward Surface, the inward, which adheres to the Substance of the *Testicle*, is rough and uneven. Into the upper part of this *Membrane* are inserted the *Blood-Vessels*, *Nerves* and *Lymphatics*, which send from thence divers Branches into the Substance of the *Testicle*.

The Lym-
phæducts.

The *LYMPHATICKS*, which do not appear in the common Dissections, shew themselves pretty plentifully upon this *Membrane*,

Membrane, if a Ligature be laid upon the *Corpus Varicosum*, of a *Dog*, or any other *Live Subject*. They go to the common *Receptacle of Chyle*.

The common *Capsula*, or *Membrane*, where-^{The Scro-}
 in the *Testicles* are contain'd, is the *SCROTUM*.^{tum.} This consists of two *Membranes*,^{Mem-}
 the *Exterior* being only a Production of the *Cuticula* or *Cutis*, which is here somewhat^{branes.}
 thinner than in other Parts, without any
Fat under it. The inner *Membrane* which
 is call'd *Dartos*, is only an Expansion of^{Dartos.}
 the *Panniculus Carnosus*, which, together
 with the *Cutis*, is drawn into the Figure of
 a Purse externally, this Purse is, as it were,
 divided by a Line which runs longitudi-
 nally, and parts it into the right and left
 side, and is call'd the Suture: Answering
 to this inwardly, is a *Membrane* which^{The Sep-}
 divides the Cavity just in the same manner,^{tum of the}
 being only a Production of the *Dartos*, as^{Scrotum.}
 the *Mediastinum* is of the *Pleura*. It is like
 that divisible into *Lamella*, and the *Testicles*
 are on each side loosely connected to it, by
 means of their outward proper *Tunic*. It
 serves to sustain the *Testes*, and to defend
 them from Collision against each other,
 to prevent their falling down too low, in
 which it is auxiliary to the *Cremasters*,
 and to promote the Corrugation of the
Scrotum.

From

From each *Testicle* proceeds a round hollow Body, resembling somewhat, in external appearance, a large *Nerve*, which is call'd *VAS DEFERENS* or *EJACULANS*. It arises from the Extremity of the *Epididymis*, and is nothing else but a Production of the *Seminal Tabulus* or Channel, which is continued from thence to the *Vesicula Seminales*. It is about the bigness of a small Goose-Quill, and ascending along with the *Vasa Preparantia*, it makes several Serpentine or Worm-like Turnings and Windings, before it leaves the Body of the *Testicle*, where it composes that Body call'd the *Epididymis*, and thence enters the *Abdomen*, with the aforementioned Vessels, through the Perforations of the *Transverse* and *Oblique* Muscles. Having enter'd the *Abdomen*, it is reflected towards the back of the *Bladder*, and crossing the *Ureter*, grows larger as it approaches the *Vesicula Seminales*, and then again contracting it self just at the *Vesicula Seminales*, the two *Deferents* come together, and seem to pass between them into the *Prostates*, and through them into the *Urethra*, without communicating, till then, either with one another, or with the *Vesicula Seminales*, or *Prostates*.

The *Vas Deferens* App. Tab xxxii. Fig. I. L L L K.

The *Epididymis*.

Controversie concerning the Conveyance of the Seed into the *Vesicula Seminales*.

It has been a Controversy among the *Anatomists*, whether the *Vasa Deferentia* had any Communication with the *Vesicula Seminales*, or did deposite into them the Seed,

Seed, which they convey'd from the *Testicles*. Dr. *Wharton*, *Swammerdam*, *Van Horn*, and of late Dr. *Garth*, in his *Lectures* at the *College of Physicians*, have maintain'd the Negative, as others have done the Affirmative, whose Reasons for their Opinions, we shall take notice of by and by.

The VESICULÆ SEMINALES, are Vesiculæ Seminales. App. Tab. xxxiii. Fig. 1, 2. two Membranous Bladders, situate between the *Vesica Urinaria* about the Neck, and the *Intestinum Rectum*. They are ordinarily three or four Fingers breadth long, and one broad, and about the third part of an Inch thick, though their Dimensions vary very much in the same Subject, according as they are full or empty.

They consist of divers Membranous Cells, Cellulæ Vesicularum Seminalium which are plainly to be seen in a *Vesicula Seminalis*, blown up and dry'd, and afterwards cut. These Cells open one into another, as appears by the ready Communication of the *Flatus*. They are not all of a size, but some are greater, some less, and all are form'd out of the same *Fibrous Membrane*, through the Contraction of which, by the Influx of the Animal Spirits in *Coitu*, some will have the Emission to be occasion'd; though I cannot think the *Fibres* sufficient for that Purpose.

These *Vesiculæ* appear externally, variously and unequally contorted and convoluted, resembling the irregular Figure of Convoluti-
ons of the
Vesiculæ
Semina-
les. the

the *Intestines* of a small Bird, cover'd with a thin *Membrane*, upon which creep many Branches of *Arteries*, *Veins*, *Nerves* and *Lymphaticks*.

No Communication
between
the Vesi-
cles.

From each side they empty themselves, without communicating with each other, into a small Duct, which about a Fingers breadth below the Neck of the Bladder, is inserted separately into the hinder part of the *Urethra*.

Septum
feu Caput
Gallina-
ginis.

Between the Mouths of each of these Ducts, is a small *Septum* plac'd, to hinder the Seed coming from one side from rushing upon, and so stopping the discharge of the other. This *Septum* is call'd, *Caput Gallinaginis*, or *Galli Gallinacei*, and on each side of it, through the fore-mention'd Orifices, the *Seed* rushes into the *Urethra*.

Caruncle
serving
as
a Valve.

Tab. iv.

But lest the *Seed* should perpetually leak at each Orifice, a *Caruncle*, serving for a *Valve*, is plac'd, which hinders it from ouzing weakly out, but when it is emitted with vigour, gives way, and after the Force is over, recovers the Situation again.

The Pro-
states.

The *Prostates* form a *spongy glandulous Body*, somewhat flattish on its upper Surface, situate just below the Neck of the *Vesica*, about the bigness of a *Wall-nut*. Authors have ascrib'd to it a Substance of two kinds; one *Glandulous*, and the other *Spongy* or *Porous*, which latter seems in reality to be nothing else, but a *Congeries* of very minute *Vessels*,

Tab. Ib.
& v.

Vessels, and extreamly small Membranous Cells: In the middle of *those* run the *Excretory Ducts* of the *Vesicula*, passing quite through without any Communication. It has *Excretory Ducts* of its own pretty numerous. *De Graaf* does not remember to have observ'd them fewer than *ten* in Men, and in Dogs he has seen near an *hundred*. Every one of these discharges it self into the *Urethra*, some above, some below the *Caput Gallinaceum*, but all more *laterally* than the Orifices of the *Vesiculae Seminales*; having each of them its proper *Caruncle*. Out of these issues a sort of *Glutinous transparent Liquor*, which some would have to be a *third* sort of *Seed*, but in my opinion serves only to lubricate the Passage of the *Urethra*, and thereby to prevent any Adhesion of the *True Seed*, which might hinder its being emitted with a sufficient *Impetus*. The *Prostates* are externally cover'd with a Fibrous Membrane, somewhat like that of the *Vesicula*, and through it are dispers'd the same sort of Vessels, and from the same Parts, as *Arteries* and *Veins* from the *Hypogastricks*, and *Mesaraicks*, and *Nerves* from the *Plexus* of the *Pelvis*.

Their numerous Excretory Ducts.

Their Liqueur no Seed.

Those who with *De Graaf* (which is the greatest part of Anatomists) hold that the *Vesiculae Seminales* are *Receptacles* only of *Seed*, elaborated before in the *Testicles*, and convey'd thither by the *Vasa Deferentia*,

Vesiculae Seminales are the *Receptacles* only of the *Seed*.

R

are

are press'd by the Arguments of their Adversaries, who urge that the *Vasa Deferentia* are continued down to the *Urethra*, without imparting or receiving any thing by the way; and this they infer from the *Vasa Deferentia* being brought, as it were, below the *Vesicula Seminales*, and approaching them only at their Extremity, where, whatever they contain, should rather, as they think, go out than come in. But, this is no conclusive Argument, unless they did prove by an absolute Mechanical Necessity, that no Fluid in an Humane Body could enter, and come out again at different times, and under a different Force or Pressure by the same Orifice.

Argument to the contrary from the Position of the Orifices of the *Vasa Deferentia* inconclusive.

That Objection answered.

Communication between the *Deferents* and *Vesiculæ*, demonstrated by Blowing into the *Deferents*.

But, not to answer one Objection with another, which might easily be done, it is plain that the *Vasa Deferentia*, and *Vesicula Seminales*, do communicate one with another, by the ease wherewith the *Flatus* passes from the *Vas Deferens* to the *Vesicula* of the same side, and the Facility wherewith it is blown up, or Liquors are injected by a Syringe that way. This proves that there is a Communication in Fact, and it is not sufficient to ask, why Nature should choose to make this Seminal Liquor, as it were, turn back again, to ascend and fill the *Vesicula*, rather than to have inserted the *Vas Deferens* into the upper part of it, and so to have fill'd it the more obvious way.

way. For tho' we should confess the reason of such a Procedure to be strange and incomprehensible to us, yet that would not alter the Nature of the Fact. It should, indeed, caution us to be more Modest in pronouncing concerning Particulars, whereof we were not sufficiently inform'd, and rather incline us, ingenuously to confess our Ignorance, and to wait till time, and farther Application, or the Industry of others, shall open to us the Mystery, than, when we cannot discover the real way by which Nature operates, to fall to inventing first the End, and then the Means, which has been an old, but a very disingenuous Method of Philosophizing in *Physick*.

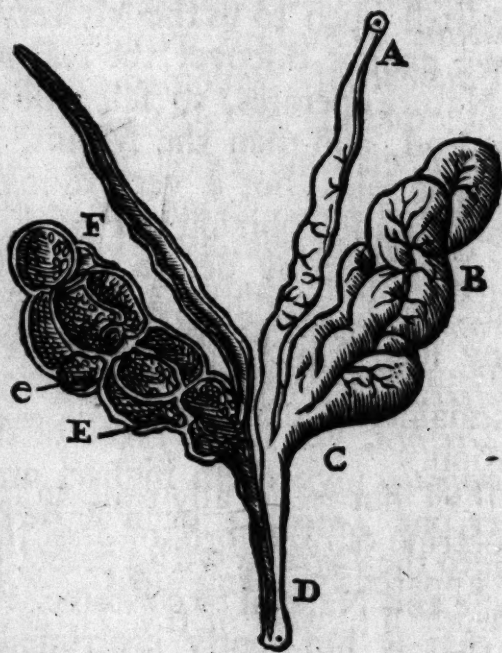
But the Difficulty before us, is neither so great, nor so puzzling, as to force Men into any such Shifts. For admit that the *Vasa Deferentia* be continued to the *Caruncles* in the *Urethra*, yet if the Neck of the *Vesicula Seminales* joyn them higher, and form together one *Tubulus*; or if it be but inserted into the *Deferens* with a patent Orifice, it is easie and Natural to conceive, that the *Seed*, that is but gently protruded along the *Vas Deferens*, arriving at the *Caruncle*, should there be stopp'd, and the Protrusion still continuing, should rather deflect laterally into the *Vesicula*, which is open, altho' that may be call'd, in some measure, re-mounting, than force the Obstacle of

*Manner of
their Com-
munication*

the *Caruncle*, whose resistance is greater than that of the Weight of so much *Seed*, as one of these *Deferents* will contain.

Illustrated
by the Des-
cent of Wa-
ter in a
Fork'd
Tube.

This is so far from being hard to be conceiv'd, that it is the constant and regular Course of all Fluids, in such Cases. For Example, Let us suppose a *Tube*, form'd in the Figure of a Y, or, which is all one, of the *Vesicula Seminalis* on the Left side here figur'd.



A. The Left Vas Deferens.

B. The Left Vesicula Seminalis.

C. The Place of their Communication, at which the Seed is reflected into the Vesicle.

D. Their Common Orifice clos'd by a Caruncle instead of a Valve.

F. The Right Vas Deferens cut through after having been inflated and dried.

E, e. The Cells of the Vesicula Seminalis, as they appear in that State.

If you pour Water into (A), it will readily descend to (D); but if at (D) there be a Valve plac'd, which neither the Weight of the Water, nor the Force of its Direction, are able to overcome the Resistance of, then the Water will deflect at (C), and rise up into (B).

This Simple Piece of Mechanism, is what The Mechanism Simple and easie of Conception so many ingenious Men have stumbled at, and thought themselves oblig'd to suppose, several sorts of *Seed* to be form'd in these uncommunicating Parts: A trouble certainly they would not have put themselves to, if they had observ'd how easily the *Flatus* passes in a Body recently dead. But perhaps the ill Success of this Experiment, try'd upon a stale Body, when the Membranes were cold and stiff, and the Parts collaps'd and cohering, made these Learned Persons maintain, that there was no Communication.

We shall not spend any time in refuting that Doctrine of *three* sorts of *Seed*, because Doctrine of the several sorts of Seed, why taken up of late. it was apparently taken up to avoid this Difficulty. The *Seed* of the *Testicles*, and *Vesiculæ Seminales*, appear manifestly the same, and nothing was wanting to make them be allow'd so, but to prove the Communication: The *Prostatal* Liquor is by most acknowledg'd not to be *true Seed*, no more than that which is emitted by *Women*: Nor is there any good Reason, why any Body should call it so, the appearance being

so very different, and another sufficient Use found.

Glands of
the Vesicu-
læ, sepa-
rate no
Seed.

The Learned Dr. *Wharton's* ground, of imagining a peculiar sort of *Seed* to be separated in the *Vesicula*, (which was his Observation of a great many *Glandules* in them, which he suspected to be the *Organs* through which the *Seed* was separated,) would have been more material than the former, if those *Glands* which he mentions, had been considerable for their Number or Magnitude. But they are so far from being sufficient for that Office, that they are not conspicuous, and by most other Anatomists, have been unobserv'd. *De Graaf*, who sought for them expressly, denies their Existence. It seems therefore unreasonable to assign that Office to them, whilst their Existence is controverted.

Probable
use of those
Glands.

However, it is not improbable, that the *Vesicula Seminales* may be furnish'd with *Glands*, as the *Vesicula Fellea*, and *Urinaria* are. But then we cannot assign them any other use, than those *Glands* have in their respective Parts, that is, to afford a *Mucous* Lining with this difference, that it is not to protect the Membrane from any *Acrimony* of the *Seed*, but to *lubricate* it, and facilitate the Expression of it, lest it should otherwise adhere to the Inside of the Membrane, as all Viscous Fluids are apt to do, to the sides of a dry Vessel.

CHAR.

C H A P. XXI.

Of the P E N I S.

SYLLABUS.

Præcipue Observandorum in

Pene	Cuticula		
	Cutis		
	Præputium		
	Structura		
	Ligamenta	{	Frænum
		{	Suspensorium
		{	Inguinales
	Glandulae	{	Præputiales
		{	Mucilaginosæ Cowperi
	Corpora Cavernosa	{	Penis
		{	Urethra
		{	eorum
		{	Substantia
	Bulbus-----ejus Septum		
	Glans		
	Musculi	{	Acceleratores Urinae
		{	Directores
		{	Transversales
		{	Penis
		{	Arteria
	Vasa	{	Vena
		{	Nervi
		{	Lymphaductus

THE CUTICULA of the P E N I S, *The Cuti-*
differs not from that of other parts, *cula.*
unless on the Glans, where it is very deli-

cate and thin, and appears to have a smooth Surface, not rough and squamous, as that of other parts, when view'd with magnifying Glasses.

*The Cutis
or Skin.
Tab. iv.
A A.
The Pre-
puce.
Ib. a a.*

The *Skin* it self is not so thick, as it's generally found on other Parts. The doubling of it on the *Glans* makes the *Preputium*. Nature does not seem more wanton in any part of her Works than in this, especially the *Prepuce*, for the Figure and Proportion of which, I can scarce find any Standard. From hence, perhaps, arose the Necessity of *Circumcision*, so generally practis'd in all the *Oriental* Parts, as well as among the *Jews* to this day. The first of which, use it out of Cleanliness, and to prevent Diseases, which the Detention of the *Mucus* of the *Subpreputial Glands* might breed in those Hot Countries. For even here I have seen some, who having large *Prepuces*, such as they call *Filberd Prepuces*, who have been frighted at the odd appearance of that *Mucus* ouzing out, upon meer Plenitude, from between the *Prepuce* and *Glans*. Perhaps the Great Law-giver of the *Jews*, had a regard to this Convenience in the first Institution of *Circumcision*: For we still meet with a great many Instances, where that Operation, or something like it, is necessary. It is tyed to the lower part of the *Glans*, by a *Ligament* call'd the

*The Liga-
ment of
the Penis.*

Frænum.

Frænum. In this also Nature varies; for The Frænum. it's often so short, that unless it be divided, it Tab. vii. a will not admit of perfect *Erections*.

At the Connexion of the other part of Glands the internal Skin of the *Præputium*, are under the Prepuce. divers Oval and roundish little *Glandules* Tab. iii. a. b. placed irregularly, and that not only in the Neck, or joyning of the *Glans* to the *Corpora Cavernosa*, but on the *Glans* it self. Use of the Liquor they separate. By these *Glandules*, is separated that Liquor that renders the Agitation of the *Præputium* on the *Glans* easie; when this Liquor becomes rancid, as it does in old People, and in *Venereal* Contacts, it excoriates the *Glans* and *Præputium*, and very often exulcerates, and renders the *Prepuce* liable to contract, Causes of the Contraction of the Prepuce. and obliges the Patient to have it divided. The Extremity of the *Prepuce* is apt to grow so strait in old Men, that they cannot bare the *Glans*, perhaps through the Defect of frequent *Erections*.

The other *Ligament* belonging to the *Penis*, is call'd *Suspensorium*, from its Office, Ligamentum Suspensorium Penis. in holding up the *Penis* to the *Ossa Pubis*. Tab. II. Fig. I. y. It arises from the fore-parts of those Bones, and becoming thicker, divides for a Passage to the great Vein of the *Penis*, and is fasten'd to the upper parts of the *Corpora Cavernosa Penis*, on each side the great Vein of the *Penis*.

The *Penis* is naturally destitute of *Fat*, No Fat on the Penis. and when it happens to have any (as there are

are Instances) it is a Disease, and incommodes it in the execution of its Office. In Children you will commonly find *Fat* on the *Penis*, but in grown Bodies it's seldom found, tho' the *Membranes* between the *Skin* and *Corpora Cavernosa* remain, and it's not improbable, that frequent *Erections* may prevent their *Cells* being charg'd with the *Oil*, which composes the *Fat*, as appears by the Microscope. This want of *Fat*, makes the *Skin* of this part very loose, and distensible, and the Membranous Body between the *Skin* and *Corpora Cavernosa* divisible into several Coats, as appears when this part becomes affected in an *Anasarca*, in which the *Membranes* of this part, and the *Scrotum*, have been found thickned to more than three or four Inches. The external Teguments remov'd, the Body of the *Penis* offers it self; First,

*Corpora
Cavernosa
Penis.
Tab. 3.
P.P.A.D.*

The two *Corpora Cavernosa*, and the *Corpus Cavernosum Urethrae*, and their Vessels, frame the Body of the *Penis*. The two Cavernous Bodies, by some call'd *Corpora Nervosa*, *Spongiosa*, &c. have two distinct beginnings from the lower sides of the *Ossa Pubis*, where they are smallest, which soon growing large and thick, joyn to each other, where they meet with the Cavernous Body of the *Urethra*, for which they leave an Interstice, or Channel, in their lower side, wherein is receiv'd the *Cavernous Substance*

of

of the *Urethra*. The superior Surface of those Cavernous Bodies, have a small Interstice, or Channel, also near the *Pubes*, in which the *Vena Penis* is lodg'd: Both these joyn by the Intervention only of a *Septum*: This, towards the back or upper part of the *Penis*, is very thick and strong, and seems to be compos'd of the two outward thick Membranes, or Cases of the *Corpora Cavernosa* joyn'd to each other: The other Extremities of the two *Corpora Cavernosa* are Capt with the *Glans*.

Their Septum.
Tab. iv.
Fig. ii.
A A.

The third Cavernous Body of this part, is call'd *Corpus Cavernosum Urethrae*, because the *Urethra*, or passage of Urine in the *Penis*, is inclos'd with it. Its external Figure differs very much from that of the two *Corpora Cavernosa*, for whereas they are lessen'd at their two Extremities, this is there largest, and lessen'd in its middle. Its upper part, that is plac'd between the two beginnings of the *Corpora Cavernosa* before they unite, I call, after Mr. Cowper, its *Bulb*, from its Figure, which is large, thick and round, not unlike a Clove of Garlick, or an Onion. Its external Membrane is here very thin, and it is divided according to its length, by a *Septum* that is thickest toward the *Urethra*, which is not incompass'd with this Cavernous Body, till it passes under the two *Corpora Cavernosa* at their meeting. This Bulbous part of the *Corpus Cavernosum Urethrae*,

The Corpus Cavernosum Urethrae.
Tab. iv.
Fig. 1.
L. M. N.
O. Q.

Bulbus Urethrae.
Tab. v.
Fig. 1. I.

Septum Bulbi.
Tab. 7.
Fig. 3.
a. a.

Cut through
in cutting
for the
Stone.

Urethra, is plac'd in that part call'd *Perinaeum*, which is between the *Scrotum* and *Anus*, and is cut through to come at the *Urethra*, in the Operation of Cutting for the Stone in the Bladder: It is cover'd with the *Musculus Accelerator Urinae*, of which elsewhere. The middle part of this *Corpus Cavernosum Urethrae*, is almost Cylindrical, but the passage for the Urine is not through its Center, but inclines to its upper part next the Body of the *Penis*.

The Glans.
Tab. iv.
Fig. 1.
N. O. Q.

The other Extremity of this *Corpus Cavernosum Urethrae*, is again dilated, and makes that Body, call'd the *Glans*, its external Figure, is well known; it receives the Extremities of the *Corpora Cavernosa Penis*, in a Cavity or Depressure of it. Its internal reticular Substance is closer than that of the *Penis*. The Symmetry of these Parts being known, we come next to treat of their Vessels, and Internal Structure: First of

Arteries
of the Pe-
nis.
Tab. vi.
Fig. 1.
G. G.

The *Arteries*, which arise sometimes from the Internal *Iliac* Branches, but most commonly from the lower parts of the *Umbilical Arteries*, whence it is, perhaps, that this Part is less than usual, by tying the Navel-string too close, not only by the Retraction of the *Urachus* through its Continuity with the *Bladder*, and consequently the *Penis*, but the *Arteries* of the *Penis* springing from the *Umbilical*, are liable to Coarctation, if they are over-

over-extended, whereby the requisite Plenty of Influent Blood is denied the *Penis*: Before these *Arteries* reach the *Penis*, they commonly send out two or three Branches on each side, the two Inferior of which, carry Blood to the *Musculi Directores Penis*. The two Superior convey Blood to the adjacent parts, particularly to the *Musculi Levatores Ani*, between which, and the *Musculi Mar-supiales Femorum*, these great Trunks pass; but marching over the *Cavernous Bodies* of the *Penis*, they are both sub-divided into two large Branches, the two Inferior of which (i i), pass to the *Bulb* of the *Cavernous Body* of the *Urethra*; but the two Superior (k k), are both sub-divided again; the External (d d) running on the superior Surface of the *Cavernous Bodies* of the *Penis*; the Internal (l l) entering their *Capsula*, pass through the middle of each *Cavernous Body* (D D), wherein they divide into innumerable Branches; from whose Capillary Extremities are continued so many *Veins*, in the Channels of which are divers Apertures into as many *Cells* (D), that communicate with each other, that empty themselves into larger Venous Ducts (C), running on the superior Surface of the *Penis*, some of which joyn with the Veins of the *Prepuce* (d), others make one large Trunk, which is call'd *Vena Penis* (M), marching on the *Dorsum Penis*, immediately under the

*Musculi
Directores
Penis.*

Ib.

Ib.

Ib.

Ib.

Ib. Fig. ii.

*The Veins
of the Pe-
nis.*

Ib. Fig. ii.

Tab. iii.

Ib.

the *Ligament*, that ties the *Ossa Pubis* together internally; by which *Ligament* that *Vein* is compress'd in an *Erection*, as shall be shewn by and by; but this *Vein* proceeding farther on the *Prostata*, it is there divided, and enters the *Internal Iliac Veins* on each side. The *Veins*, which arise in like manner from the *Corpus Cavernosum Urethrae*, pass from its *Bulb* through the *Musculi Acceleratores* (CC), and are compress'd by those *Muscles*.

Tab. vii.
Fig. 1.

Nerves.
Tab. vi.
Fig. 1.
H H.

The *Nerves* spring from a *Trunk* composed by the *Coalescence* of the third of the *Os Sacrum*, and a *Branch* remitted from the great *Crural Nerve*, which after their union, provide *Nerves* for the *Testes*, *Perineum*, and *Muscles* of this part; which ascending on the *Cavernous Bodies* of the *Penis*, expand themselves on its upper Surface (cc), and are afterwards distributed to all the parts of the *Penis*.

Ib.

Lymphæ-
ducts.
Ib. L L.

The *Lymphaducts* of the *Penis*, are very Numerous on its Surface under the Skin, in that loose Membrane that is in the place of the *Membrana Adiposa*. If you blow into the *Veins* of a *Dogs Penis*, its *Lymphaducts* will be inflated after its *Cavernous Body* is extended: These, like the *Lymphaducts* of the lower parts, discharge their *Lympha* into the *Glandula Inguinales*: Hence, perhaps, the *Morbid Matter* in *Claps* is transferr'd into these *Glands*, and causes those

Tab. vii.
Fig. v.

Discharge
themselves
into the
Inguinal
Glands.

Tumors,

Tumors, call'd *Buboes*, from the *Glands* call'd *Bubones*. On this account the opening of these Tumours, before the usual time for *Suppuration* in other Tumours, appears necessary, lest the Peccant Matter be convey'd by the exporting *Lymphaducts* of those *Glands* into the Mass of Blood; of which we meet with too many Instances.

The Cause
of Buboes

The Internal Structure of the *CORPORA CAVERNOSA*, agrees exactly with that of the *Spleen*. The *Arteries* of the *Penis*, after they enter its *Corpora Cavernosa*, are distributed into its *Reticular Substance*, which are chiefly compos'd of *Membranous Filaments*, deriv'd from the *Capsula* or sides of the *Corpora Cavernosa*, or their *Septa*; These *Filaments* are variously intertext with (as they pass from the sides of the *Corpora Cavernosa*,) and support the *Ramifications* of the *Blood-Vessels* and *Nerves*. The *Veins* of the *Corpora Cavernosa* do not pass from it, as they commonly do from other parts in particular Channels, but their sides are here punch'd with numerous holes, that open into this *Cavernulous Substance*, which have such Communications, as that if you blow into either beginning of the *Corpora Cavernosa*, they both are readily distended; but the *Corpus Cavernosum Urethrae* will not be affected, tho' the other two are distended with Wind, unless in some Subjects (which is very rare) in whom the *Veins* happen to

The Sub-
stance of
the Caver-
nous Bo-
dies.

Fila-
ments.
Ib. Fig iv.

Exact Re-
semblance
of the Stru-
cture of the
Spleen.

to let the Wind pass from the *Cavernous Bodies* of the *Penis*, to that of the *Urethra*. From this Structure of the *Penis*, we may be inform'd of the particular Use of its Parts.

Office of
the Penis.

This Structure shews that the *Penis* is strictly an Organ of *Generation* only, and that the conveyance of *Urine* was not consider'd by Nature in this Mechanism, that being as well answer'd in Birds, Women, and all Female Creatures another way. But an Incitement to the Propagation of their Species had perhaps been wanting, but for this Organ; tho' the way of Propagation in most kinds of Fishes, seems to argue the contrary. But of that we shall have occasion to speak more at large hereafter. At present it may suffice, that without such an Instrument, the *Seed* of the most perfect Animals could not be convey'd to the place of *Prolification*: And that an Alternation, as occasion requires, of *Erection* and *Flaccidity*, was absolutely necessary, the first, to the Performance of its Office, the latter, for the Security of the Part: Since without an *Erection* it were impossible to emit, and lodge the *Seed* where it ought to be, and with a Constant one, almost as impossible to secure the Part from many of those Injuries to which it would be perpetually expos'd; not to mention the loss of *Instigation*, which must be a necessary

cessary Consequence of Constant Erection.

That the Blood is the Matter which distends the *Corpora Cavernosa Penis* in an Erection, is manifest from abundance of Experiments, tho' the most certain is that of firmly tying the *Penis* of any Animal, (as has been done frequently to a Dog) in Coitu, in which nothing but Blood has been found that distended it. In the Bodies of Criminals, that hang long after Death, the *Penis* becomes erected, the Blood, in that Position, falling to the Inferior Parts and stopping there. By blowing into the Blood-Vessels after Death, the *Penis* becomes erected.

This was first observ'd by the Accurate Mr. Comper, upon viewing its *Veins*, after he had distended them with Wind, whence it was very plain, that the *External Trunks* pass'd some under its *Skin* only, and some over the *Ossa Pubis*; which, for distinction, he call'd *Vena Preputii*. Besides these, a vast number of *Veins* (on the *Dorsum Penis*) unite, and empty themselves into one *Trunk* call'd *Vena Penis*, which passes immediately under a Transverse Ligament of the *Ossa Pubis*, and is compress'd by the Approximation of the *Dorsum Penis*, to the Ligament of the *Pubis*. This Application of the *Dorsum Penis* is effected by its *Musculi Directores*, pulling down the *Crura* of the

*Penis, both
erected*

*The Blood,
by what
means de-
tain'd.*

Corpora Cavernosa Penis, which are ty'd up at their Juncture in the Body of the *Penis*, to the *Ossa Pubis*, by the *Ligamentum Suspensorium* above mention'd.

Corpus
Caverno-
sum Ure-
thræ, how
erected.

This cannot happen to the *Cavernous* Body of the *Urethra*, because there is no *Bone*, whose Position (in *Human* Bodies, and most *Quadrupeds*) can give rise to a *Ligament*, which can have that effect on its *Veins*. Wherefore the *Musculi Acceleratores*, embracing the *Veins* of the *Bulb*, do that Office, tho' not so effectually as in the *Penis* it self; whence it is that the *Glans* is not always perfectly distended with the *Penis*, and soonest becomes flaccid on an *Erection*.

Blood,
how its
Circulation
is conti-
nued in
Erection.

The *Blood*, by these means, being hindered in its return, the *Corpora Cavernosa* must necessarily be distended, if we consider the Structure of them above mention'd, with respect to the *Veins*. The *Arteries*, which before were flaccid, have now their Trunks also extended, and do more plentifully import Blood into the *Corpora Cavernosa*. But since it is absolutely necessary, some part of the detain'd Blood should be still passing off, lest it becomes Grumous and unfit for a Reflux, the *Vena Praputii* communicate with those of the *Penis* it self, as before observ'd; whereby part of the Blood may be return'd from the

the *Penis* during its *Erection*, and give way to a fresh supply from the *Arteries*, and preserve the *Circulation* in it uninterrupted. By this we are taught how to relieve an obstinate *Priapism*, by opening the *Vein* of the *Penis*.

This admirable Contrivance, in disposing these *Exporting Sanguiferous Ducts*, so that some are compress'd, whilst others remain altogether free and open, is not only seen in the *Penis* of *Men*, and *Pudenda* of *Women*, but in those parts of all other Animals, that have fallen under our Examination; with some difference of Instruments only, in some particular Creatures; as Mr. *Cowper* has instanced in the *Male Opossum*, *Philosophical Transactions*, In the Opossum. No. 290. P. 1584. This Retardation of the *Refluent Blood*, is chiefly continued by means of a *Sphincter Muscle*. In a *Male Porpoise*, In the Porpoise. long since dissected by Mr. *Cowper*, were found *two Bones*, with their *Ligaments*, framed on purpose for this end. In a *Dog*, In Dogs. he some time since observ'd likewise, a *Digastrick Muscle*, whose *Middle Tendon* pass'd transversely on the *Veins* of that Animal's *Penis*, which seem'd to be provided by *Nature*, that when *in Coitu*, tho' the *Dog* is turn'd off the *Back* of the *Bitch*, and his *Penis* drawn off from the *Ossa Pubis*, which, without that *Transverse Muscle*, would make way for the *Blood* to pass off, and let its *Bulb*,
S 2 by

Analogous
Structure

by which the *Dog* is ty'd to the *Bitch*, grow flaccid.

Muscles
of the Pe-
nis.

Tab. vii.

Fig. i. CC

Tab. v.

Fig. i. L.

Accele-
rator U-
rinæ.

The *Muscles* of the *Penis* are two Pair, and one odd *Muscle*; the first, that offers it self in Dissection, is the ACCELERATOR URINÆ, which appears on dividing the *Skin* and *Fat* in the *Perinaum*. It's often joyn'd with the *Sphincter Ani*. It arises *Tendinous*, but soon grows *Fleshy*, from the upper and fore-part of the *Urethra*, as it passes under the *Os Pubis*; its fleshy part incompassing the *Bulb* of the *Corpus Cavernosum Urethrae*; Both sides of this *Muscle* meet in a middle Line, corresponding to the *Seam* in the *Skin* over it: It continues so united about two Inches in length, then detaches two *Fleshy Elongations* (cc), which become thin *Tendons*, at their Terminations on the *Corpora Cavernosa Penis*. This, is commonly made a *Pair* of *Muscles*, but in truth is but *One Muscle*. Its upper part, that covers the *Bulb*, when in *Action*, streightens the *Veins* that pass through it from the *Corpus Cavernosum Urethrae*, and hinders the *Reflux* of the *Blood* in an *Erection* of the *Penis*, and by the repeated Contractions of this upper part, drives the *Blood* in the *Bulb* towards the *Glans*: The two *Elongations*, that part on the *Urethra*, and ascend to their Terminations on the *Corpora Cavernosa Penis*, so compress its Channel, as to force out the contain'd *Seed* or *Urine*, from which latter Use it has its Name. The

The *Erectores Penis*, so call'd from their use, spring Flefhy each from the *Os Ischium*, below the beginning of the *Cavernous Body* of the *Penis* on the same fide, and after an oblique Progreſs, end partly Tendinous, and partly Flefhy, in the beginning of that *Cavernous Body*. When *Theſe* act, the *Penis* is drawn to the *Pubes*, and by means of the *Ligamentum Suſpenſorium Penis*, its *Great Vein* is apply'd to the *Transverſe Ligament* of the *Oſſa Pubis*, and the Reſluent Blood hindred from paſſing that way, where- by its *Corpora Cavernoſa* become diſten- ded. The laſt Pair of *Muſcles* that be- long to the *Penis*, are call'd from their Po- ſition

Erectores
Penis.
T. ib.
F. ib.
F. G.

Transverſales Penis. Theſe are often want- ing, and frequently vary in different Sub- jects: Sometimes *They* are deriv'd from the *Sphincter Ani*, and terminate in the *Bulb* of the *Cavernous Body* of the *Urethra*. At other times you'll meet with a *Muſcle* on one ſide only: But ordinarily *They* ariſe from the *Iſchium* near the former, and are inſerted on both ſides the *Corpus Cavernoſum Urethrae*, immediately below its *Bulb*. When they Act, they dilate either the *Bulb*, or that part of the *Corpus Cavernoſum Urethrae*, to which they are faſten'd.

Trans-
verſales
Penis.

Tab. v.
Fig. i.
K. K.

Tab. vii.
Fig. i. EE

Mr. Cow-
per's Mu-
cous
Glands of
the Ure-
thra.
* Philos.
Transf.
N^o. 258.
November
1699.

Tab. v.
Fig. 1.

Ib.
Fig. ii.
Ib.

Mr. Cow-
per's Third
Mucous
Gland of
the Ure-
thra.

There remain yet to be accounted for *Three small GLANDS* discover'd by * Mr. Cowper, and not yet taken notice of by any other *Anatomist*. They all empty themselves into the *Urethra*, and are by Mr. Cowper, from the Tenacity of the Liquor which they separate, call'd the *MUCOUS GLANDS* of the *Urethra*. The two first discover'd of these are about the bigness of a French Bean, of a depress'd Oval Figure, of a yellowish colour like the *Prostates*, and lie on each side the *Bulb* of the *Cavernous Body* of the *Urethra*, a little above it (G G). Their *Excretory Ducts* spring from their *Internal Surface* (A b), next the Inner Membrane of the *Urethra* (C), whence descending about half an Inch, they begin to grow less, and piercing that Membrane obliquely, open into the *Urethra* at (D) by two distinct *Orifices* just below its bending, under the *Ossa Pubis in Perinaeo*, where they discharge a *Transparent Viscous Liquor*.

Besides this Pair, there is a *Third MUCOUS GLAND*, discover'd likewise by the same Mr. Cowper, to whose happy Sagacity, Industry, and Communicative Temper, the Inquisitive into this part of Knowledge are infinitely indebted. This is describ'd by him in the Appendix

to

to his *Euxaesia*, and is a small Conglobate yellowish Gland like the former, but somewhat less. It is situate about the Angle of Flexure of the *Urethra*, under the *Ossa Pubis* in the *Perinaum* near the *Anus* (F), as it was drawn from a Preparation, which Mr. *Cowper* has still by him. To find this Gland, the *Corpus Cavernosum Urethra* must be divided lengthways to the Inner Membrane of the *Urethra*, which must be cautiously freed from the Body; which done, the Gland will appear in the Place already mention'd. It has two *Excretory Ducts*, which enter the *Urethra* obliquely about a quarter of an Inch below the Orifices of the two former (K), and discharge a Liquor like theirs both in Colour and Consistence.

Tab. iv.
Fig. ii.

Mr. *Cowper*, who is always Ingenious, and generally Right in his Conjectures about Anatomical Matters, thinks there may be two Uses of this *Mucus*. The First, to hinder any Remains of *Urine* from mixing with the *Semen*, in the *Urethra tempore Coitus*, which I can find no reason to expect there at that time. Yet I must subscribe to his Opinion, that the main Design of Nature, in framing these Glands, seems to respect the Grand Work of Generation. For by their Situation, they must necessarily be compress'd upon Ere-

Tab. ib.
Fig. i.
Where the
Excretory Duct of
the Right
side only is
express'd.

tion, and consequently discharge their Contents before the *Testes* and *Vesiculae Seminales*, which are not subject to so immediate a Force. I apprehend therefore, that their *Mucus* serves to lubricate the Pipe of the *Urethra*, and thereby to facilitate the *Emission* of the *Semen*, and render it more Vigorous and Projectile, than otherwise it could probably be, if so viscid a Liquor, as the *Semen*, were to pass through a Channel absolutely dry, to which it would be apt to adhere, and so its Projection be obstructed.

Much less can I think, that they were by Nature contriv'd to defend by the *Mucus*, which they afford, the *Urethra* from the Acrimony of the *Urinous* Salts. For, to answer that end, the *Urethra* should be constantly lin'd with it, and the discharge continual, as it is in a *Gleet*, when the *Caruncula*, which closes the *Excretory Duct* of any of these *Glands*, happens to be eroded, as we observ'd it once in a Servant of mine; of which Mr. *Comper* has given us the History, and the Figure, in his *Description of these Glands*, publish'd before his *Euxaestia*, both which I have thought worth the transferring hither. But as these *Glands* do not emit their Liquor *in Statu Sano*, but upon Compression, which cannot happen but in *Erection*, and that

that a pretty stiff one too, by reason the Resistance of the *Caruncle* must be forc'd, it is not probable, that this Liquor should be always discharg'd previous to the *Urine*, which is as often made with a *Flaccid Penis* as otherwise. Nor indeed do I see any need to hunt for any other Use, than that which I have assign'd in the preceding Paragraph.

Mr. *Cowper* having, with his Description of the first discover'd *Pair* of the *Glands*, hinted his Suspicion, that an *Inveterate*

Cause of
Invete-
rate
Gleets.

* GLEET might proceed from a *Venereal* Ulcer happening upon the *Ostium* of either of these, whence, if an absolute *Erosion* of the *Caruncle* ensued, an *Incurable Gleet* might follow, an opportunity presented it self to me, to examine into the certainty of that Opinion, in a Servant of mine who died of a *Peripneumony*, but had been some Years troubled with an *Obstinate Gleet*. In this Subject we found that the *Caruncle*, which should have clos'd the *Duct* of the *Mucous Gland* on the Left side, had been eroded by an Ulcer, and the Orifice of that, and of the Left *Duct* of the single *Mucous Gland*, laid into one, as appears by Tab. IV. Fig. I. (*) drawn from it by Mr. *Cowper*. Hence proceeded an almost constant Dripping of a Diaphanous Viscid Roapy Liquor, such as these *Glands* furnish, which is what we call a *Gleet*,

* Philos.
Trans.
November
1699.

a *Gleet*, and must necessarily happen to all Persons under the like Circumstances.

What a
Clap is.

He that considers, that a *Clap* is nothing but an Ulcer rais'd in the *Urethra*, by the Insinuation of some *Virulent*, or to speak more properly, *Acrimonious* Purulent Matter into it, will not wonder, that it should often hang and fix its Seat at the *Ostiola* of these *Excretory Ducts*. But of these Matters I shall take another Occasion to speak more largely.

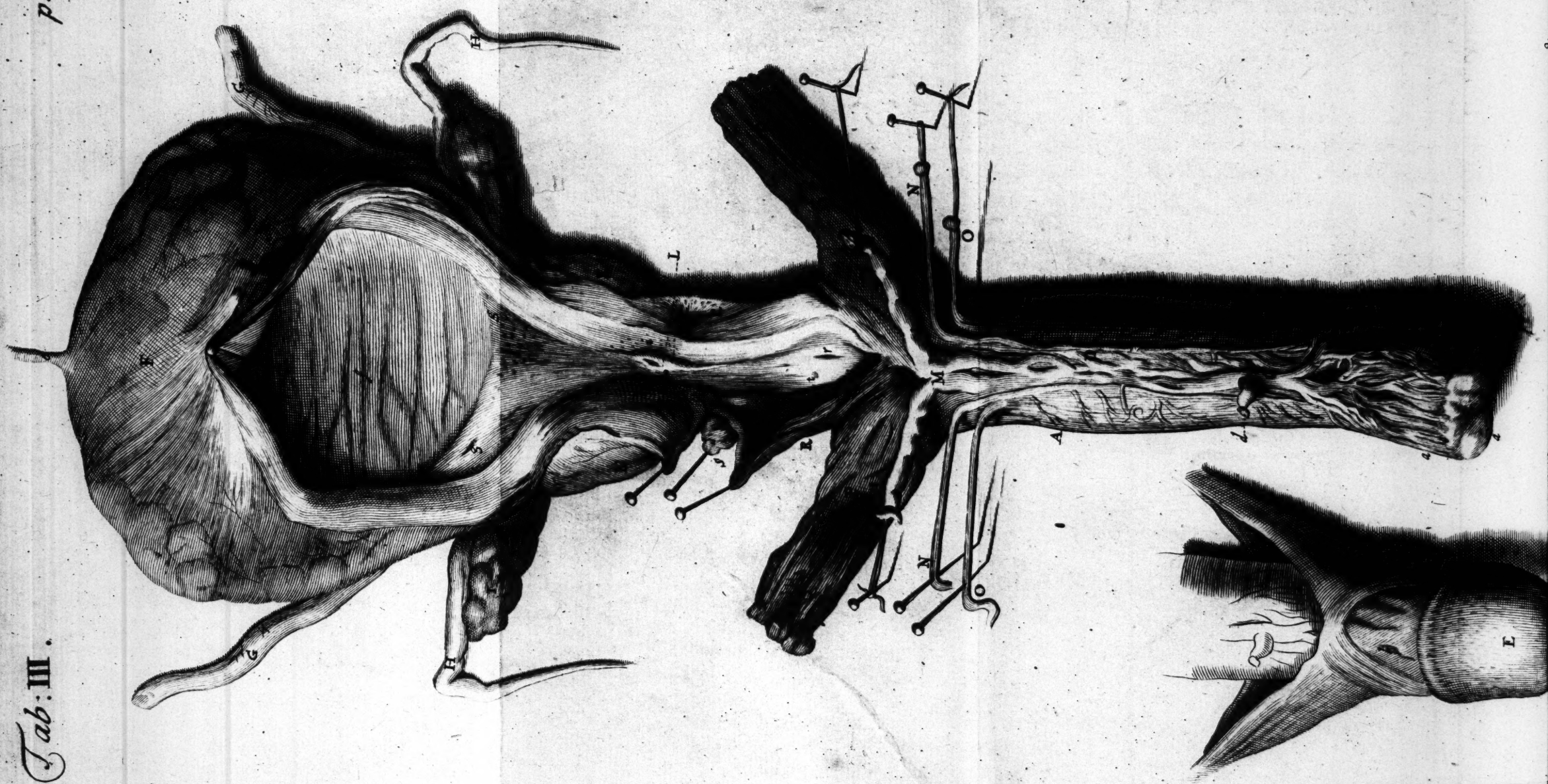
T A B.

1
1
3
e
k
1
f
1
k

04

Tab: III.

p. 268.



T A B. III.

THE Fore-parts of the *Bladder of Urine*, and *Corpora Cavernosa Penis*, &c. somewhat less than the *Life*.

A A. The whole *Corpora Cavernosa Penis*.

a a. Their Extremities which are capt with the *Corpus Cavernosum Glandis Penis*.

B. The Skin of the *Penis*, which makes the *Praputium*.

h. Its *Duplicature* or internal Surface, that is continued to the *Glans*.

C D. The *Blood-Vessels* on the *Dorsum Penis*, fill'd with *Wax*.

c c. Their Trunks cut from the *Glans*.

d. A Trunk of the *Vein* that receives Branches from the *Prapuce*, by which the *Wax* was injected, to fill the *Veins* at M D C.

E. The *Glans Penis* fill'd with *Wax*, by the *Vein*.

e. A Portion of the *Urachus*.

F. The Fore-part of the *Bladder of Urine*.

f. Its inward *Nervous Membrane*, through which the order of *Muscular Fibres* may be seen.

g g. The two Orifices of the *Ureters*, as they open into the *Bladder*.

h. The small *Glands*, which may be seen by the naked Eye, between the two Orifices above mention'd, that separate the *Mucus*, which defends this Internal *Membrane* of the *Bladder* from the *Salts* of the *Urine*.

G G. The *Ureters* cut off.

H H. Portions of the *Vasa Deferentia*.

II. Parts

II. Parts of the *Vesicula Seminales*.

KK. The Fore-part of the *Prostates*, which are here divided together with the *Urethra*.

L. The *Caruncle*, or *Caput Gallinaginis*, which hinders the *Seed* from perpetually leaking at the two Orifices on each side of it here mark'd o o.

ii. The *Mouths* of the *Excretory Ducts* of the *Prostates*, on each side the *Caput Gallinaginis*.

M. That part of the *Vein* of the *Penis*, that is compress'd by the *Ligament* of the *Pubis*, in an *Erection*.

NN. The *Arteries* }
OO. The *Nerves* } on the *Dorsum Penis*.

PP. The beginnings of the *Corpora Cavernosa Penis*, cut from the *Ossa Pubis*.

QQ. The *Musculi Directores Penis*.

RR. The *Urethra* divided and expanded.

S. The *Mucous Gland* of the Right side pinned out.

t. The Orifice of its *Excretory Duct*, as it appear'd with its *Mucus* in it, ready to be discharg'd.

r. The *Mouth* of the *Excretory Duct* of the Left *Mucous Gland*, which was very open in this subject, being in common with another *Mucous Gland* of the same side, express'd in the following Table, Fig. 1. *. and Fig. 2. F.

T A B

T A B. IV.

F I G. I.

THE Fore-part of the *Urethra* open'd, to shew the *Orifices* of the *Excretory Ducts* of the *Mucous Glands*, somewhat less than the *Life*.

A A A. The inside of part of the *Bladder* of *Urine*.

B. A *Probe* in the Left *Ureter*, to shew its entrance into the *Bladder* of *Urine*.

C. The Right *Ureter*, whose lower part is slit open, to shew its Oblique Insertion between the *Membranes* of the *Bladder*, before it opens into its Cavity.

D. The *Miliary Glands* of the *Bladder*.

E E. Parts of the *Vesicula Seminales*.

e. The *Blood-Vessels*, which are distributed on the *Vesicula Seminales*, and lower parts of the *Vasa Deferentia*.

F F. The *Prostates* divided and open'd.

fff. The sides of the *Urethra* divided and pinn'd out.

G. The *Caruncle* or *Caput Gallinaginis*, with the *Mouths* of the *Excretory Ducts* of the *Prostates* on each side, as in the preceding Table i L.

H H. The two first and largest *Mucous Glands* pinn'd out,

I I. Two *Probes* in their *Excretory Ducts*, of which, the *Orifice* of the Right side is in its Natural State:

(*) The other * was enlarged in this subject by an *Ulcer*.

K. A small *Probe* in the *Excretory Duct* of lower and lesser *Mucous Gland*, vid. Fig. 2. F.

L. The

L. The *Bulb* of the *Cavernous Body* of the *Urethra* fill'd with Wax.

M M. The sides of that *Cavernous Body* fill'd with Wax, and divided according to its length, to shew its inside.

N. The *Glans Penis* fill'd with Wax, from the *Vein* mark'd d. in the preceding Figure.

O. The Cavity fram'd in the *Corpus Cavernosum Glandis Penis*, in which the Extremities of the *Corpora Cavernosa Penis*, of the foregoing Figure mark'd a a a, are receiv'd.

Q. The upper part of the *Glans* next the *Penis*.

P. Part of the *Membrana Carnosa Penis* pinn'd down.

F I G. II.

PArt of the *Bladder of Urine* and *Urethra* of a *Boy* inflated.

A. The lower and hinder part of the *Bladder of Urine*.

b. B. The *Vesicula Seminales* blown up by

C C. The *Vasa Deferentia*.

D. The *Prostates*.

E E. The *Urethra* clear'd from its *Cavernous Body*.

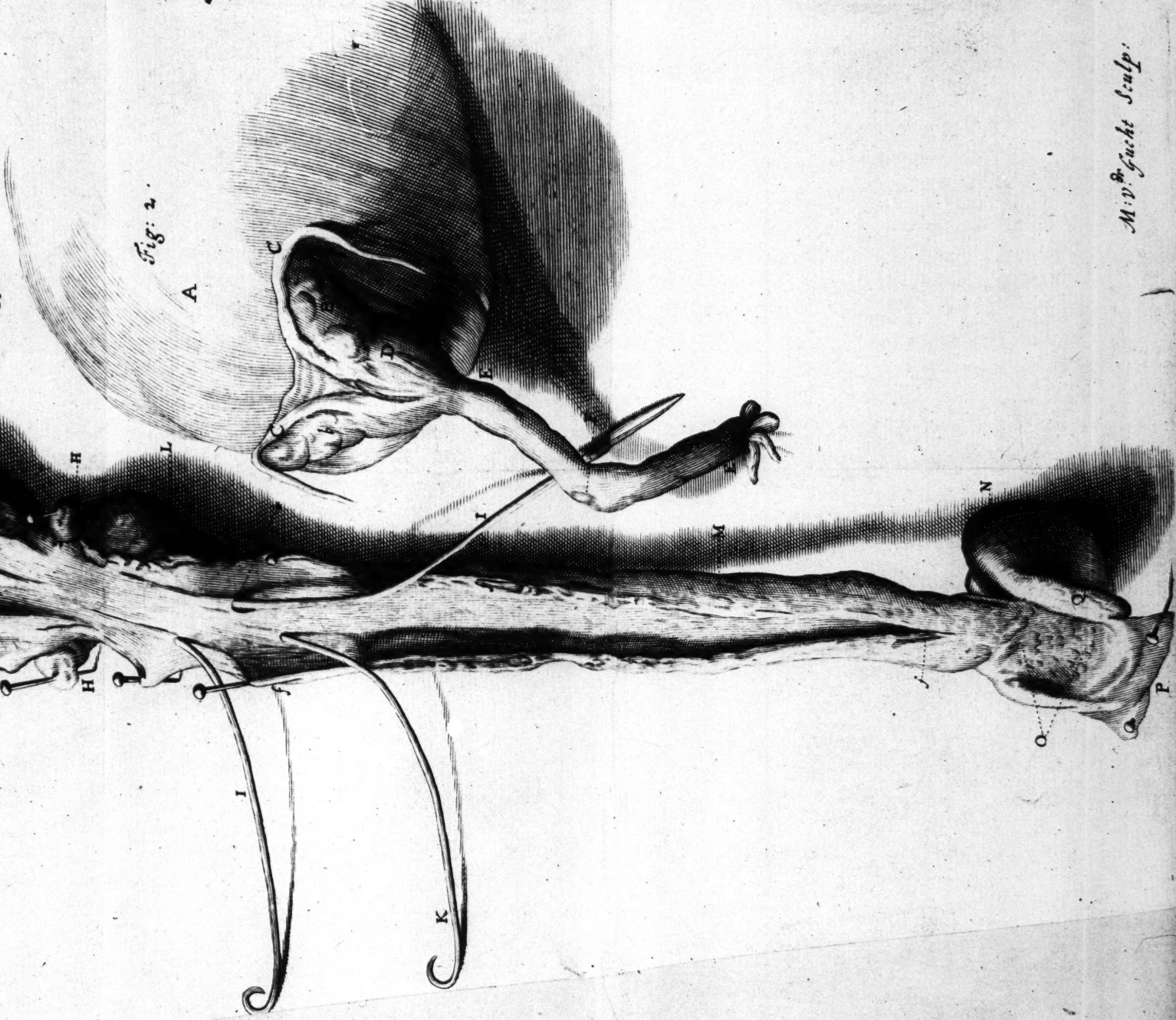
F. The lesser *Mucous Glands* plac'd at the Angle, or turning of the *Urethra* under the *Ossa Pubis*.

T A B.

Fig: 1.



Fig: 2.



T A B. V.

F I G. I.

A, **A** Portion of the *Bladder of Urine*.

BB, Parts of the *Ureters*.

CC, Parts of the *Vasa Deferentia*.

DD, The *Vesicula Seminales* somewhat distended with Wind, by blowing into the *Vasa Deferentia*.

a a, The Blood-Vessels of the *Vesicula Seminales*.

E, The *Glandula Prostata*.

F, The *Urethra* expanded after opening its superior and fore part to see the *Ostiola* of the *Excretory Ducts* of the following *Glands*.

GG, The two *Glands* above describ'd, which from the *Liquor* they separate, (are call'd by Mr. Cowper, who discover'd them) *Glandulae Mucosae*.

h, The *Excretory Duct* of one of the last mention'd *Glands*, before it passes under the *Bulb* of the *Cavernous Body* of the *Urethra*.

I, The *Bulb* of the *Cavernous Body* of the *Urethra*, partly distended with Wind, and divested of the *Accelerator Muscle*, to shew its *External Membrane*, which is very thin, whereby the last nam'd *Muscle* does more adequately compress the *Bulb*, and drive its contain'd *Blood* towards the *Glands*, when the *Penis* is erected.

K, The third Pair of *Muscles* of the *Penis*.

LL, The *Accelerator Muscle* divided in its middle *Seam* on the *Bulb*, and afterwards freed from it, and Expanded.

ll, The

ll, The upper part of the *Muscle*, which passes immediately over the *Mucous Glands*.

MM, The *Musculi Directores Penis*.

NN, The *Cavernous Bodies* of the *Penis*.

O, The *Cavernous Body* of the *Urethra*.

P, The *Ligature* made to prevent the Wind from passing out of the *Cavernous Body* of the *Urethra* and its *Bulb*.

Q, The *Aperture* by which the *Inflation* was made.

FIG. II.

ONE of the *Mucous Glands*, after being macerated in *Water*, and its *Excretory Duct* fill'd with *Quick silver*.

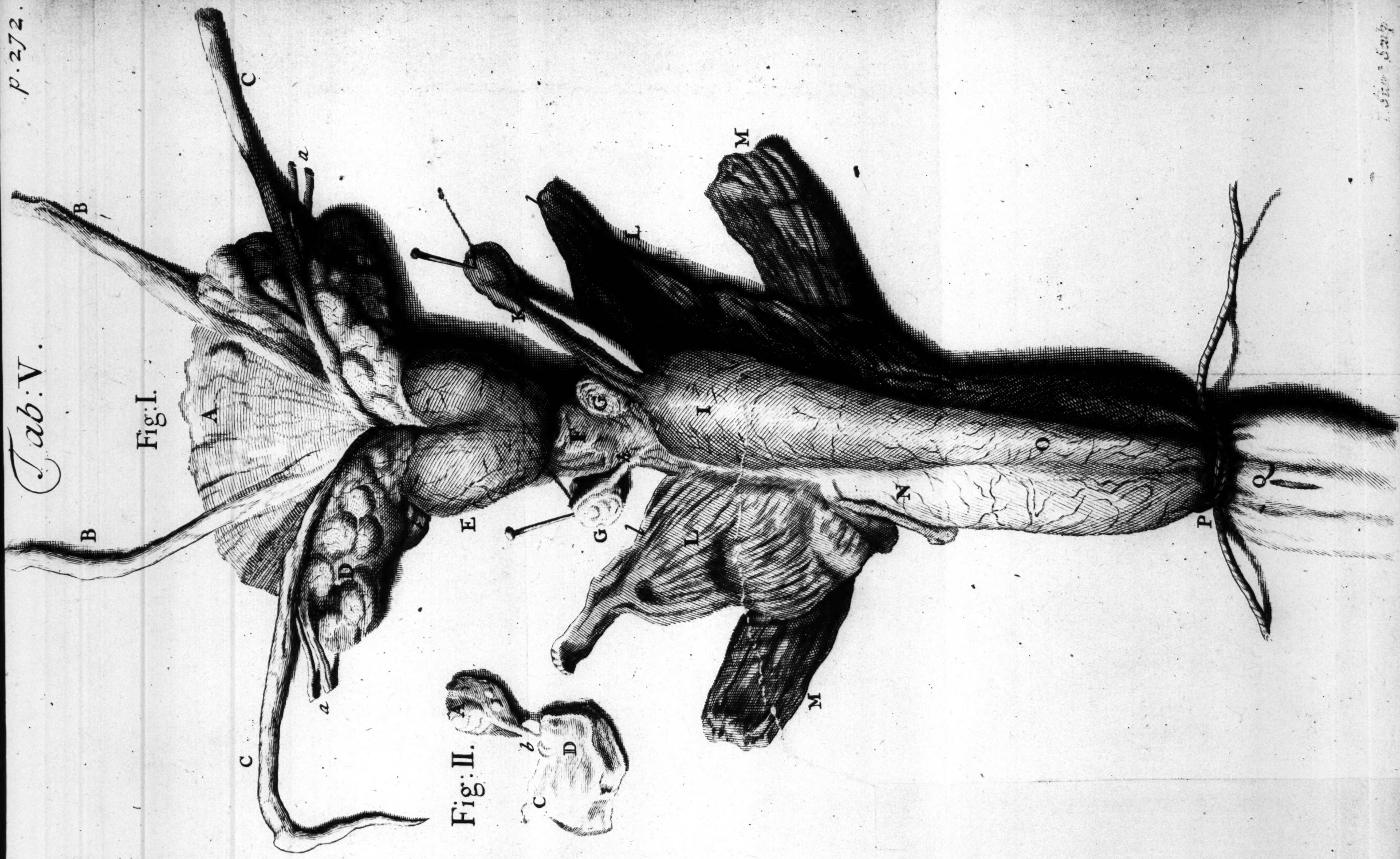
A, The *Mucous Gland* somewhat distended.

b, Its *Excretory Duct*.

C, A Portion of the *Internal Membrane* of the *Urethra* Expanded.

D, The *Ostiolum* of the last mention'd *Excretory Duct*.

Fig. 1.



T A B. VI.

F I G. I.

T H E Fore-part of the Human *Penis* prepared with *Mercury*.

A A, The Skin, together with the rest of the Common Integuments of the *Penis*, freed from it.

a a, That part of them which compose the *Præputium*.

B, The beginnings of the *Corpora Cavernosa* separated from the *Offa Pubis*.

b b, The Veins; c c, The Nerves; d d, The Arteries, as they appear on the back-part, or *Dorsum Penis*. (cc) (dd)

C, The *Glans* or *Balanus*.

D D, The *Musculi Erectores*.

E E, The *Transversales*.

F, Part of the *Sphincter Ani*.

f, A Blow-Pipe in the *Urethra*.

G G, The Trunks of the two Arteries of the *Penis*, Cut from the Internal Branches of the *Iliac* Arteries: g g, Their two Inferior Branches (g g) which run to the *Musculi Erectores*; h h, Their (h h) superior Branches which administer Blood to the adjacent Parts; i i, Those Arteries which (i i) pass to the *Bulb* of the Cavernous Body of the *Urethra*; k k, Their large Trunks which are (k k) subdivided again; the External of which d d, (d d) pass on the superior Surface of the *Penis*; the Internal l l, enter the *Corpora Cavernosa*. (l l)

H H, The Nerves of the *Penis*.

I, The *Vena Penis*.

T

K K, *Vena*

KK, *Vena Preputii* which inosculate with the former.

LL, The *Lymphaducts*.

F I G. II.

THE two *Corpora Cavernosa Penis*, and that of the *Urethra*, after a Transverse Section, when Inflated and dry'd.

A A, The *Corpora Cavernosa Penis*.

B, The *Corpus Cavernosum Urethra*.

C, The Trunk of the *Vena Penis*.

DD, The Trunks of the two Arteries passing through the *Corpora Cavernosa* of the *Penis*.

Fig. I.

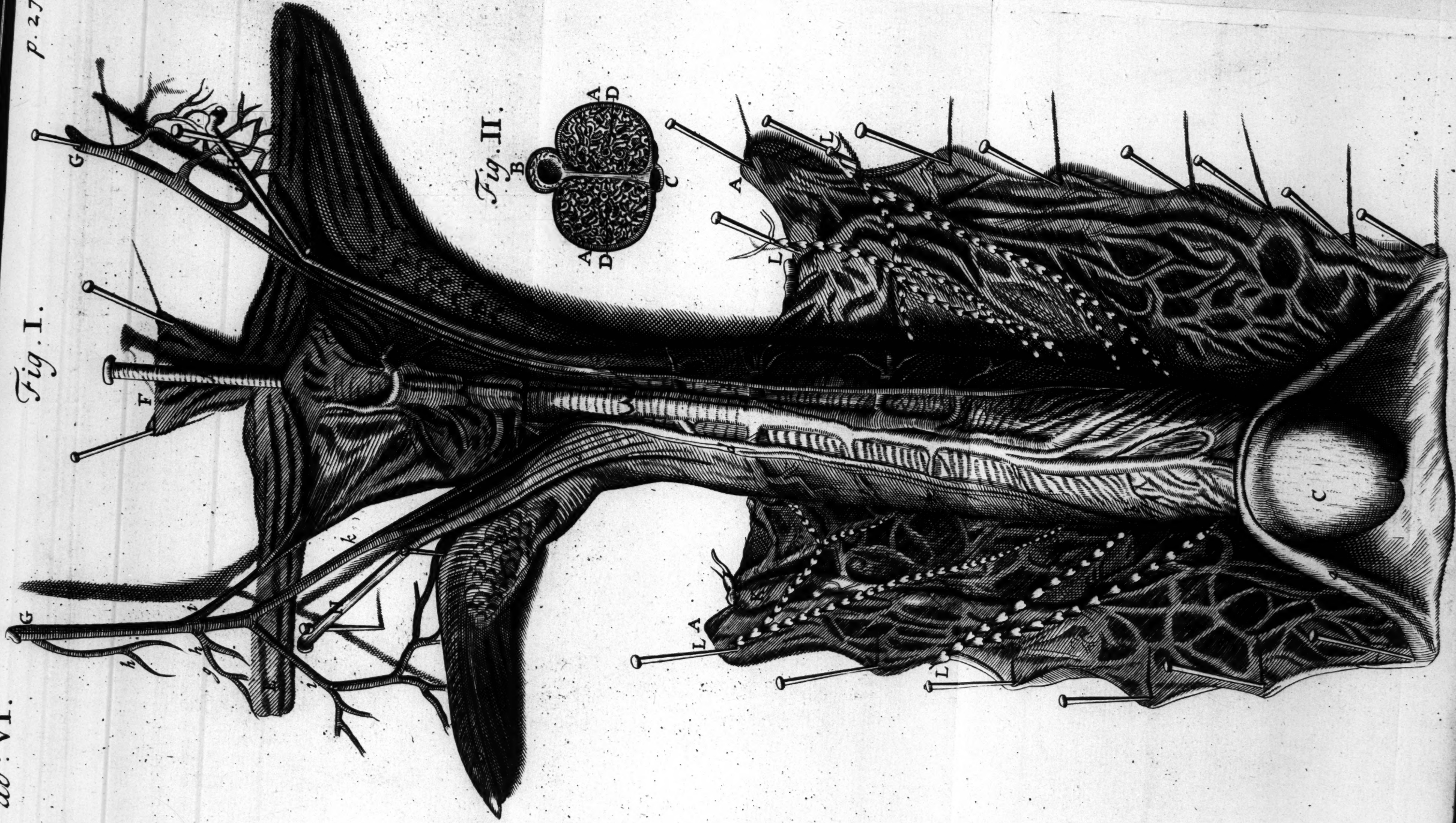
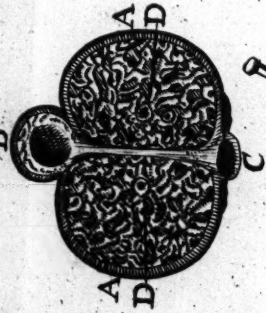


Fig. II.



T A B. VII.

F I G. I.

T H E Back part of the Human *Penis*.

A, The *Balanus*.

a, The *Franum*.

B, The External Surface of the *Corpus Cavernosum Urethrae*.

CC. Its *Bulb* cover'd with the *Musculus Accelerator* ; b, The Conjunction of its Right side (b) with the Left, corresponding to the Seam of the Skin in the *Perinaeum* ; cc, Its two Extremities embracing the *Corpus Cavernosum Urethrae*, (cc) which terminate on the sides of the Cavernous Bodies of the *Penis* it self.

D, Part of the *Sphincter Ani*.

EE, The *Musculi Transversales Penis*.

FF, The *Directores* or *Erectores*.

GGGG, The *Corpora Cavernosa Penis*.

HH, The Arteries ; ddd, Those Branches administering Blood to the *Muscles* ; ee, Two large (ddd) (ee) Trunks of them which are subdivided into two more, f g. (f g)

II, The Nerves of the *Penis*.

F I G. II.

S Hews the Internal parts of the Extremities of the two Cavernous Bodies, and that of the *Glans Penis*.

A, The *Dorsum Penis*, cover'd with its *Capsula*.

B, The External part of the *Glans*.

a, Part of the *Septum* of the *Corpora Cavernosa*.

bb, The Internal Membrane of the *Corpora Cavernosa Penis*, cover'd by the *Glans*.

C, The *Corpus Cavernosum Glandis Penis*, on the Extremities of the *Corpora Cavernosa Penis*.

T 2

F I G.

F I G. III.

EXhibits the *Bulb* of the Cavernous Body of the *Urethra*, being dry'd after Inflation.

A, The External part of the *Bulb*, divested of the *Musculus Accelerator Urinae*.

B, Part of the *Bulb* raised after Section, to shew its Internal Cavernous Structure.

a, *Septum Bulbi*.

CC, *Musculi Transversales*.

F I G. IV.

SHews part of one of the Cavernous Bodies of the *Penis*, being likewise dried after Inflation.

A, That part of the *Capsula* of the Cavernous Body next the *Os Pubis*, which is here compress'd by the Ligature made to retain the Wind.

B, *Musculus Erector Penis*.

CC, The Artery as it is distributed within the Cavernous Body of the *Penis* on either side.

F I G. V.

Represents the *Bulb* of a Dog's *Penis* after Inflation.

A, The External Surface of the *Bulb*.

B, A Ligature made on a Vein that arises from the superior part of it, into which the Veins of the *Prepuce* enter, and may therefore be call'd *Vena Preputii*.

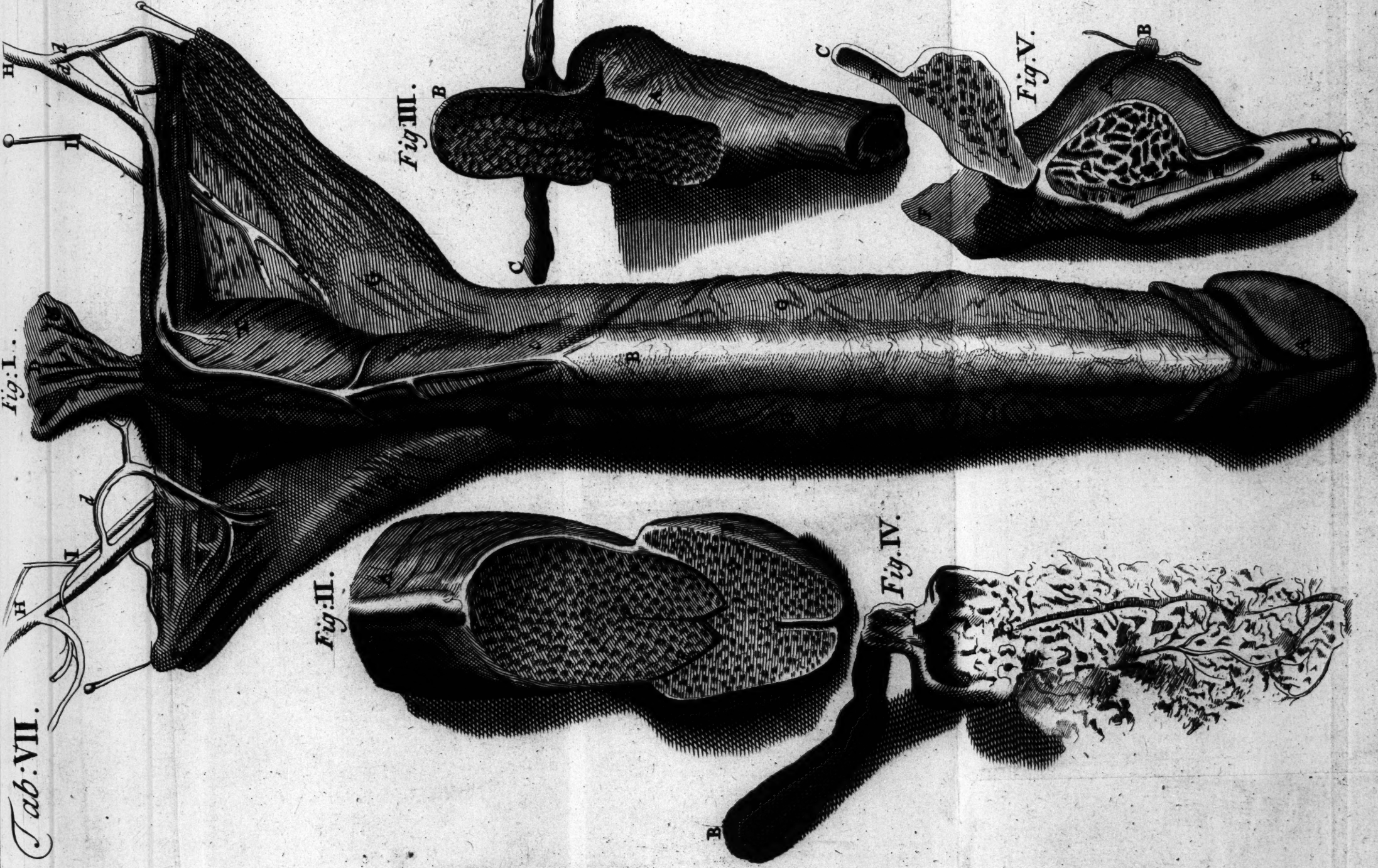
CC, The large Trunk of one of the Veins of the *Penis* it self, which in this Animal is double, arising from each side the *Bulb*.

D, The Internal appearance of the *Corpus Cavernosum* of the *Bulb*.

EE, The Cavity of the Vein which communicates with the *Cavernula* of the *Bulb*.

FF, *Corpus Cavernosum Penis*.

C H A P.



led us into. But this being a single Subject, and a Specification of the Difference betwixt Sexes, we shall follow the Method of *De Graaf* in it, as the most Natural, and the most Easie for an Inquirer to follow.

Division. The PUDENDUM MULIEBRE is divided into Parts *External* and *Internal*: The *External* are those which offer themselves to the View without Dissection, tho' some of them require a Diduction of the *External Labia* before they can be seen. These are the *Rima*, *Labia duo*, *Mons Veneris*, *Clitoris*, *Nymphae dua*, the *Exitus* of the *Meatus Urinarius*, and the Orifice of the *Vagina*.

Rima. The *Rima* is nothing else but the External Aperture situated below the *Os Pubis*, between it and the *Anus*; and the space betwixt the *Rima* and the *Anus* is call'd the *Perinaeum*.

Labia. The Skin on each side of the *Rima* is supported and plump'd up with the *Fat* of the *Membrana Adiposa*, which is here thicker than ordinary, and makes together the *Labia*.

Mons Veneris. Just above the *Labia*, between the *Inguina*, is the space, which is call'd the *Pubes*, the middle and most prominent part of which, has been nam'd *Mons Veneris*, which is a little Protuberance occasion'd by the more than ordinary collection of *Fat* under the Skin in that place. All these parts

parts are cover'd with Hair, as most other parts, where the *Miliary* Glands of the Skin are larger than ordinary, and cover'd with *Fat*, usually are.

These being absolutely External, are expos'd to view without Diduction, and they, as well as the Adjacent, have been call'd by variety of Names, which either the Wantonness, or other Humours of Men, have furnish'd them with: But those being of no service to our present Purpose, we shall omit them, and stick only to the most Simple and Familiar of them among Anatomists, as Modesty directs us.

In the upper part of the *Pudendum*, just within the *Labia*, is the *CLITORIS*; a Body ordinarily about the size of the *Uvula* when it is not relax'd. But sometimes, by extraordinary Means, and in extraordinary Cases, it will be extended almost to the bigness of the *Penis* of a Man, which at all times it resembles very exactly in its Figure, except that it is not perforated. The extraordinary Size of this part, and its Propendence sometimes out of the Body in *Infants*, makes the Women mistake such Children for that sort of Monsters they call *Hermaphrodites*. Of this sort I had one brought to me upon another occasion, the *Clitoris* of which hung out of the Body so far, at about three Years old, that it resembled very much a *Penis*, but it wanted

Clitoris.

Tab. viii.

Fig. iii.

App. Tab.

xxxiii.

Fig. vi.

Hermaphrodites

the Perforation, and instead of that, just behind it, the Urine issued at a hole, which was nothing else but a corner of the *Rima*, the *Clitoris* filling all the rest of the Orifice: So that the Parents mistook it for a Boy, and as such Christened it, and as such esteem'd it when it was brought to me. But the Neighbours, who had notice of this Appearance, call'd it an *Hermaprodite*.

Corpora
Caver-
nosa Cli-
toridis.

The *Clitoris* consists of two Nervous or Spongy Bodies, like those of the *Penis*, which have their Origine from the lower part of the *Os Pubis* on each side, which coming together form the Body, which is call'd the *Clitoris*: Which tho' it has no Perforation Analogous to that of the *Penis*, yet has a *Septum*, or Membranous Partition, which runs all along between these two Nervous Bodies, from the *Glans* to its Divarication at the *Os Pubis*, where they are call'd *Crura Clitoridis*, and are near three times as long as the ordinary Trunk of the *Clitoris* it self.

Septum
Clitori-
dis.

Crura.

Glans
Clitori-
dis.

Tab. viii.
Fig. ii.

Muscles
of the Cli-
toris.

At the end of it is a *Glans*, resembling in Proportion, that of the *Penis*, except, as has been said, the Perforation. This *Glans* is covered with a *Præputium*, form'd out of the inner Membrane of the *Labia*.

The *Clitoris* has a pair of *Muscles* arising from the *Ossa Coxendicis*, and terminating in its *Crura*, and serving to erect the *Clitoris*.

Some

Some Authors ascribe another Pair of *Muscles* coming from the *Sphincter Ani*, which are by others thought only to be the *Constrictory Muscles* of the *Vagina*, and assist in hindring the Reflux of the Blood from the *Clitoris*, &c. in *Coitu*.

App. Tab
xxxiii.
Fig. vi.

It has *Arteries* from the *Pudenda*, and its *Veins* return to the *Hypogastricks*. The *Nerves* come from the *Intercostals*, and run in pretty large *Twigs* along the back of it. Hence it is that it appears so extremely affected in the Act of *Coition*.

Blood-
Vessels.

After the *Blood-Vessels* and *Nerves* have parted with Branches to the *Clitoris*, they are partly spent in a *Cavernulous Substance*, call'd, by *De Graaf*, *Plexus Reticularis*, that environs the *Pudendum* immediately under the *Nymphae*, to which they also send Branches: All these Parts being fill'd with *Blood*, do more adequately embrace the *Penis* in *Coitu*; and by their intumescence they not only force out the Contents of the *Lacuna*, or *Excretory Ducts* of the *Prostata*, or *Corpus Glandulosum*, in the Neck of the *Bladder*, but by excluding the external *Air*, the *Semen Masculinum* is injected to the *Fundus Uteri* and *Fallopian Tubes*; and that more especially, if we consider that the *Parietes* of those Parts are furnish'd with a vast Number of *Blood-Vessels*, especially *Veins*, and on their Intumescence, that the internal *Air* must be rarified in those

Corpus
Caverno-
sum seu
Reticu-
lare Pu-
dendi.

Tab. ix.
Fig. ii.

those Cavities, by which means the *Semen Masculinum* passes to the *Ovaria*.

Nymphæ The *Nymphæ* or *Alæ*, are soft, spongy, red Bodies, descending from the top of the *Clitoris*, (to which they firmly adhere) to the sides of the *Meatus Urinarius*, thereby reaching to about the middle of the Orifice of the *Vagina*, where growing insensibly less and less, they disappear: So that their length may be accounted, from the *Clitoris* to the middle of the Orifice of the *Vagina*: Their breadth is very uncertain, but in Maids usually about that of half a Finger. They are sometimes found much larger, and are capable of being distended to a great degree, so as to hang a good way out of the Body, and in some, these, as well as the *Clitoris*, have been forc'd to be cut.

Tab. viii. Their Figure taken together, is a kind of half Oval. Their Substance is soft and spongy, compos'd of Membranes and Vessels loosely cohering, and therefore easily distensible.

Use of the Nymphæ The Use of them is by Swelling in the Act of Coition to embrace the *Penis*, and by their Sensibility to affect the Woman, and mutually to invite to Procreation. They have their Blood-Vessels and Nerves in common with the *Clitoris*.

Orifice of the Vagina. Fig. ii. Just behind the *Nympha*, is the Orifice of the *Vagina*, which in Virgins, especially such

such as have not yet had the *Catamenia*, or but very rarely, is very streight, but in those that have had them oftner it grows larger, but more in Married Women, and most in those that have had Children.

Just above the *Orifice* of the *Vagina*, is the ORIFICE of the URETHRA, opening with a little Intumescence. It is externally cover'd with a whitish Substance, which is partly Glandulous, and partly Membranous, out of which issues a Glutinous Limpid Matter through certain Ducts, which comes from the inward part of the *Meatus*, and serves to anoint the Extremity of the *Urethra*. Orifice of the Urethra.

In the Dissection of these Parts, nothing has more exercis'd the Curiosity of Anatomists than the *Hymen*, who not only differ and contend about the Figure, Substance, Place and Perforations of it; but even about the Existence it self, which some positively affirm; others as flatly deny. And even *De Graaf* himself, the most industrious and accurate Inquirer into these Parts, confesses that he always sought it in vain, tho' in divers Subjects, and in various unsuspected Ages. All that he could find, was a different Streightness, and different Corrugations, which were greater or less, according to the respective Ages: The Younger they were, the *Foramen* being the straiter, and the Rugosities the greater, the former Hymen, Fig. iv.
the

the necessary Consequences of the latter. For as in time the Parts grew, the Membranes were extended, and so the Surface of them grew gradually more smooth and plain.

Whether it is to be found in all Subjects, I dare not affirm, but in those few which I have had opportunity to examine, I do not remember to have miss'd it in any Subject where I had just reason to depend upon finding it, if it were constant. The fairest View which I ever had of it, was in a Maid who dy'd at about Thirty Years of Age.

As De-
scription.

App. Tab
xxxiii.
Fig. ix &
x.

In Infants it appears to be a fine thin Membrane, not very conspicuous, because of the Natural Straitness of the Passage it self, and of the *Foramen*, which tho' very small, did not allow of any great Expansion in so little room, and consequently might appear to *De Graaf* a Corrugation only of the inner Membrane. But in this Subject we found it to be a Membrane of some Strength, furnish'd with Carnous Fibres, in Figure round, and perforated in the middle with a small Hole, capable of admitting the end of a Womans little Finger, situate a little above the Orifice of the *Meatus Urinarius*, at the Entrance of the *Vagina*.

Situation

It is probable that this Membrane, as most others do, grows more distinct, as well

well as firm, by Age: And that it is sometimes very strong and impervious, may be collected from the History of a Case reported by that Skilful Anatomist Mr. *Comper*, ^{An imperforate Hymen} in his *Explications* of the *Fifty first Table* of *Bidloo's Anatomy*. *I was call'd* (says he) *to a Married Woman of above Twenty Years of Age, whose lower Belly was distended as if with Child. Upon examining the Pudendum, we found the Hymen altogether impervious, and driven out beyond the Labia Pudendi, in such manner, that at first sight it appear'd not unlike a Prolapsus Uteri. In the upper part towards the Clitoris, we found the Orifice of the Meatus Urinarius very open, and its sides extruded, not unlike the Anus or Cloaca of a Cock, and without any difficulty I could put my Fore-Finger into the Bladder of Urine. On dividing the Hymen, at least a Gallon of Grumous Blood, of divers Colours and Consistencies, came from her, which was the retain'd Menstrua. The next day no less Quantity of the same Matter flow'd, after removing the Pessary, which I had put in the day before. After three or four days she was easy, and soon after recover'd, and within a Year was deliver'd of a healthful Child. Her Husband told us, tho' lying with her at first was very painful to himself as well as her, yet at last he had a more easie Access, which could be no other way than by the Meatus Urinarius.*

This

This History proves, that this Membrane is not only a strong Membrane, which could make resistance to that force, which overcame the *Meatus Urinarius*, and *Sphincter* of the *Bladder* which is considerably strong: But by admitting of so great a Dilatation, as to hang *Extra Pudendum*, shews that the Structure of it is Fibrous, and consequently capable of great Distensions.

Whether this Membrane be always to be found in unvitiated Subjects, is more than I can pretend to determine. The Scarcity of them in Adult, will not let me presume to decide upon my own Observation, and much less can I do it upon any Agreement of Authors: Among whom I find some, who are most accurate, doubtful about its Existence.

Carun-
culæ
Myrti-
formes.

App.Tab
xxxiii.
Fig. xi.
B B.

Adjoyning, or rather in the place of this *Hymen* in Adults, in whom it is not found, are four little *Caruncles*, or *Fleshy Knots*, about the bigness of *Myrtle-Berries*, from whence they are call'd *Myrtiformes*, which some suppose to be largest in Maids, and by degrees to grow less through the use of *Venery*: Others, with more probability, in my Opinion, derive them from the broken Membrane of the *Hymen*, whose Fragments shrunk up, they take them to be. Which of these is in the right, I am not able positively to say, having yet never seen them,

them, where the Use of *Vener*y had not preceded.

The *Mosaical* Test of *Virginity* has occasion'd abundance of Speculation about these Parts, concerning which, the Nicest Inquiries can settle nothing certain. What-
The Mosaical Test of Virginity, why too severe for these Northern Climates
ever might be depended upon among the *Jews*, in these Countries there may not be the same reason to expect those *Tokens* of Virginity, tho' not at all to be suspected. For, besides that they married extreamly Young, as it is the Custom of all *Eastern* Countries so to do, (whether a *Hymen* be constantly to be expected or not) there are many Circumstances which may disappoint such Expectations, even in Virgins not vitiated by any Male-Contact, or Wantonness of their own. For, whatever may be the Case of those Countries, in these Northern Climates the Inclemency of the Air exposes them to such Checks of Perspiration, as give a great Turn to the Course of the Humours, and drives so much Humidity through those Parts, as may extraordinarily supple and relax those Membranes, from which the resistance is expected, and from which, in hotter Countries, it might more reasonably have been depended upon. Not but that those Marks are ordinarily found here, but in some that have liv'd long Virgins, or are of very delicate Constitutions, the long Course, or
extra-

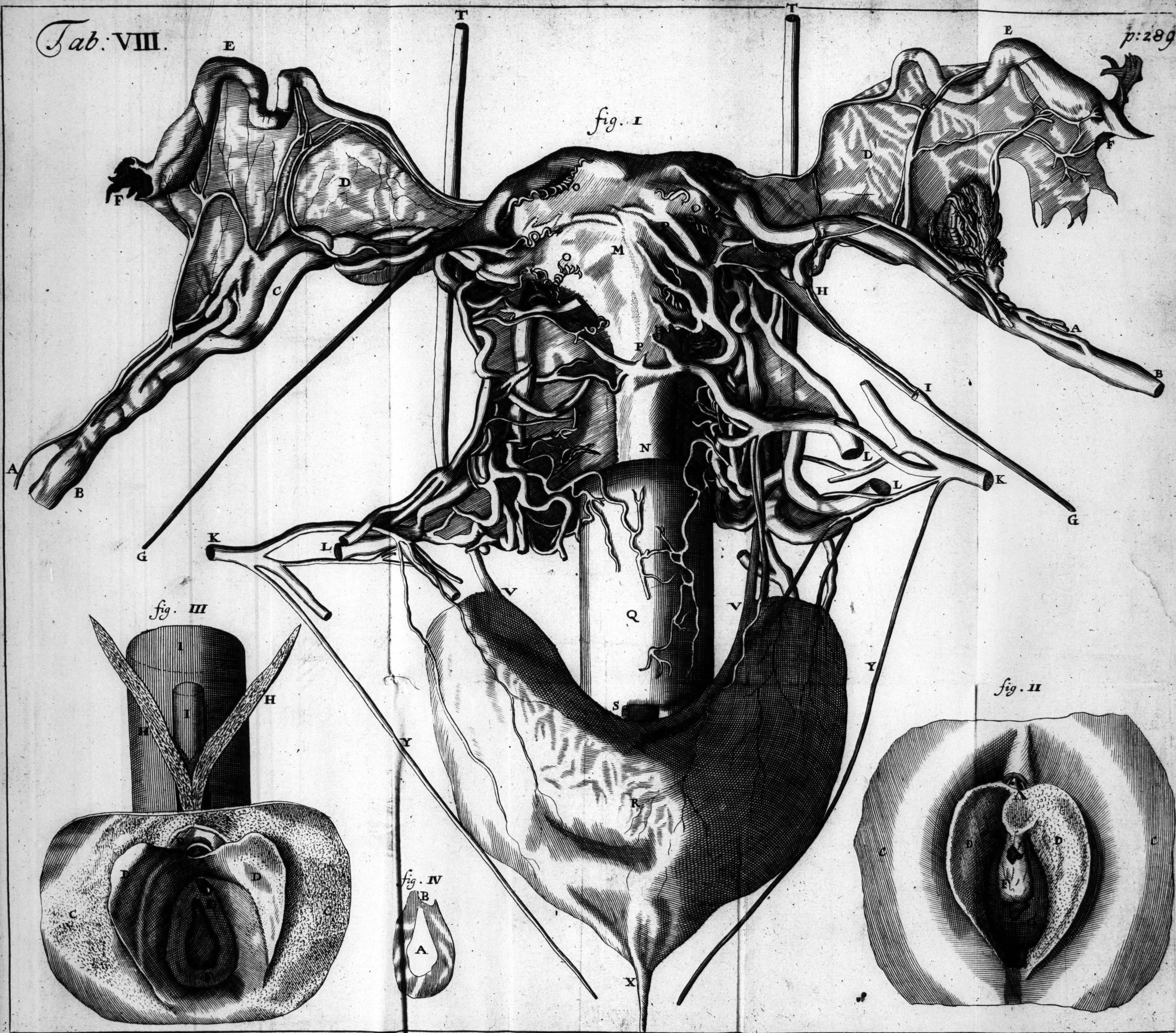
extraordinary Turn of Humours that way, may render Men unjustly Suspicious, where no real Occasion is given. For in some, who preserve their Virginities a great while, and in others, whom a delicate Constitution exposes to a long or great Course of Humours through those Parts, such a Relaxation may be occasion'd, as may deceive and offend those Men, who expect certain Marks of Virginitie, especially where a *Hymen* is wanting, which (for any thing that appears to me) may be mis'd oftner than it is found.

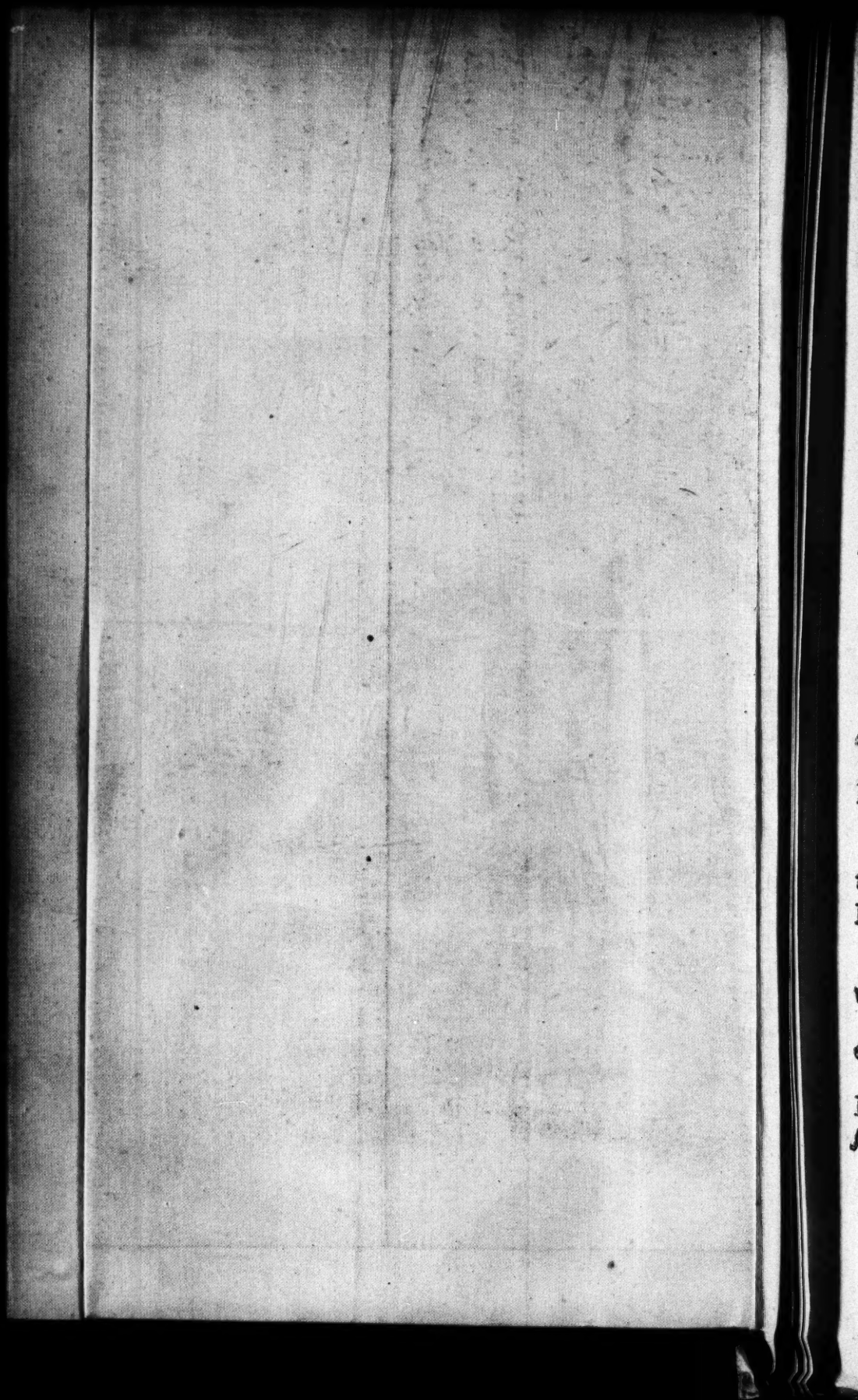
Frustrated
often by
Diseases.

But even supposing a *Hymen* whole and unbroken, that, and the Membranes of the *Vagina*, may be so relax'd, through a long and great Course of the *Catamenia*, or from the Morbid dripping of the *Fluor Albus*, that the Purest Virgin may not be able to answer here Mens Expectations from the *Mosaical Test*, whatever might be just in those hot Countries.

All that is certain in this Case, is, that they who have plainly the *Mosaical* Signs of Virginitie, cannot be suspected; the others may, tho' perhaps unjustly. There are other Accidents which may disappoint these Expectations of Virginitie, without any trespass on the Womans part, which, without a History of the Diseases of those Parts, (which it is not our Intention to give here,) it is improper to enumerate.

T A B.





TAB. VIII. From Swammerdam.

FIG. I.

THE Fore Prospect of the *Uterus* of a Woman after Delivery.

AA, The *Spermatick Arteries*.

BB, The *Spermatick Veins* distributed through the *Tubes* and *Fundus* of the *Uterus*.

CC, The *Corpora Pyramidalia*, compos'd of the *Spermatick Arteries* and *Veins*.

DD, The *Membranous* or *Broad Ligaments* of the Womb, through which the *Blood-Vessels* pass to the *Fallopian Tubes*, call'd by some, *Ala Vesperitilionum*.

EE, The *Fallopian Tubes* well express'd.

FF, Their Aperture at the *Expansum Folliculaceum*, on each side.

GG, The *Round* or *Inferior Ligaments* of the Womb.

H, The Origination of the *Veins* and *Arteries* of those *Ligaments*.

I, The *Valve* in the *Vein* of the *Round Ligament* hindring the Relapse of the *Blood* to the *Uterus*.

KK, The two *Hypogastrick Arteries*.

LL, The *Hypogastrick Veins* variously contorted, and in their Progress implicated and perplex'd with the *Arteries*.

M, *Fundus Uteri*.

N, The *Cervix*, or Neck of it, at the end of which, is the inner Orifice of the Womb.

OOO, The *Arteries* on the *Fundus*, or Bottom of the Womb, curl'd like the *Tendrils* of a *Vine*.

PP, A great number of *Veins* running over the Exterior *Tunic* of the *Uterus*, in which the *Anastomoses* are singularly remarkable.

Q, The *Vagina Uteri*.

U

R, The

R, The *Bladder* of *Urine*, inverted to shew the Tortuosity of the *Arteries* of the *Vagina*, by which means its proper *Vessels* are represented somewhat longer than they ought to be.

S, The Orifice of the *Urethra* in the *Vagina*.

TT, The *Ureters*.

VV, The Insertion into the *Bladder*, which is here turn'd downwards.

X, Part of the *Urachus*.

YY, The *Umbilical Arteries*.

FIG. II.

Exhibiting the *Pudendum* of a *Virgin*, taken fresh out of the *Body* and display'd.

A, The *Glans* of the *Clitoris* resembling that of a *Penis*.

B, The *Prepuce* of the *Clitoris*.

CC, *Labia Pudendi*.

DD, *Nymphae*.

E, The Orifice of the *Urethra*.

F, The *Caruncle*, that closes the *Meatus Urinarius*, in which are divers *Fissures*.

G, The *Hymen*.

FIG. III.

THE *Pudendum* of a *Virgin* with its *Clitoris* dried.
A, The *Glans* of the *Clitoris*, answering that of a *Man*.

B, The *Prepuce* of that *Glans*.

CC, *Labia Pudendi*.

DD, *Nymphae*.

E, The Orifice of the *Meatus Urinarius*.

F, The *Hymen*.

G, The Perforation of the *Hymen*.

HH, The *Crura* of the *Clitoris* cut to shew the Substance of its *Cavernous Bodies*.

I, The *Urinary Passage* cut off near the *Bladder*.

K, The *Neck* of the *Uterus* cut off.

FIG. IV.

A, THE Perforation, or Slit of the *Hymen*.

B, The upper part of the *Hymen* next the *Meatus Urinarius*.

The

The *Meatus Urinarius* in Women is very short: It is lin'd internally with a very thin Membrane, and next to that is a Coat of a white Substance, of which an account is given in the Description of the Orifice; Through this Coat, from some *Lacuna* in it, those Ducts pass, which convey the Liquor spoken of before in the account of the Orifice. It is very dilatable, as the Practice of Extraction of Stones, (of extraordinary Size) without cutting, proves; as well as the History before recited under the *Hymen*.

Meatus
Urina-
rius.
App. Tab
xxxv.
Fig. i.

The *Vagina* of the *Uterus*, is a Membranous part, reaching from the *Rima* just above the *Labia*, to the Neck of the *Uterus*; It lies upon the *Intestinum Rectum*, to which it firmly adheres, and under the *Vesica Urinaria*. It is reckon'd to be seven or eight Inches long.

Vagina
Uteri.
App.
Tab. ib.
Fig. ii.

The inward Substance of it is Nervous, and exquisitely Sensitive: The outward Membranous, and of a loose Texture, with carnosus Fibres running longitudinally upon it.

Substance

At the Orifice it is much narrower than elsewhere, particularly in Virgins, especially very young ones. Through the whole Course of it, it appears to be wrinkled, especially on the upper internal Surface. The Use of *Venerary* renders these *Ruga* less appa-

Ruga.

rent; and frequent *Parturition* almost obliterates them; which shews that they were contriv'd to render the Part more easily distensible for *Parturition*.

Ostia
Vaginæ.
App.
Tab. ib.
Fig. ib.

Along the whole Tract of the *Vagina*, there are a great many Pores, or *Ostia*, or little *Ducts* to be seen, which in Acts of *Venery*, emit a Liquor, that has been by many mistaken for *Seed*, and are found in greatest Plenty about the lower part of it, especially about the *Exitus* of the *Meatus Urinarius*.

The *Vagina* has likewise a *Constrictory* Muscle inserted under the *Clitoris*, which, with a broad Series of Fibres embraces, and constricts the lower part of the *Vagina*, spoken of before.

Uterus.
Tab. ib.
Fig. ib.

The *Uterus* or *Matrix*, is situated in the *Pelvis* of the *Hypogastrium*, between the *Intestinum Rectum*, and the *Urinary Bladder*. It is surrounded and defended by mighty Bones, before by the *Ossa Pubis*, behind by the *Os Sacrum*, on each side by the *Os Ilium*, and *Ischium*. It is in Figure something like a flat Flask, or a dry'd Pear. In Women that are with Child, it receives different Forms, according to the different Times and Circumstances of *Gestation*.

Magni-
tude.

In Maids and Old Women long past their *Menses*, it is pretty near of a Size. It

It is divided by Anatomists, as all other Cavities of this kind are, into the *Fundus* and *Cervix*: A broad Part, and a Neck: And is in Extent from the Extremity of one, to that of the other, about three Inches in length. Its breadth at the *Fundus* is about two and an half, and its thickness two.

Cervix.
Fundus.
Tab. ib.
Fig. iii.

It has but one *Cavity*, unless we make a distinction between the Cavity of the *Uterus*, and that of its *Cervix* or Neck. That of the *Fundus* is very small, scarce sufficient to contain a Garden-Bean. At the bottom, or Neck, it grows excessive narrow in Virgins, unless at the time of Purgation, scarce wide enough to admit a *Crows-Quill*: The Extremity of which Passage, is call'd the *Osculum Internum*. In Pregnant Women it opens more especially towards the time of Delivery. But to obviate the Inconveniencies that might happen by the Wombs remaining open, it is, as it were, seal'd up with a sort of Glutinous Matter, that issues from the Glands about it.

The lower *Orifice* of the *Neck*, looking towards the *Vagina*, is a little prominent, and resembles, in some measure, the *Glans* of the *Virile Organ*. The Substance of it appears to be very firm and compact, yet is never the less dilatable to a great degree,

Orifice of
the Neck.
Tab. ib.
Fig. ii.

as appears by the Exclusion of a full grown *Fætus*.

Sub-
stance of
the Ute-
rus,

The *Substance* of the *Uterus* is Membranous and Carnous. It consists of three *Tunics*, or according to some, who deny that Name to the middle Substance, of two only.

External
Tunic.

The *External Tunic*, which is call'd the *Communis*, is deriv'd from the *Peritoneum*. This consists of two *Lamella*, and is pretty thick and strong. The Exterior of these is smooth, the Interior somewhat rugged, and uneven, through the Connexion of the subjacent Parts. This Membrane invests the whole Womb, and connects it to the *Intestinum Rectum*, Bladder of Urine, and other adjacent Parts.

Middle
Tunic.

The *Middle Tunic* is very thick, and is compos'd of thick strong Fibres variously dispos'd. It seems to be Muscular, and is by some thought to contribute to the Exclusion of the *Fætus*, and other Contents of the Womb. Tho', in my Opinion, that is not the Office of it, and this, as the Muscular Membranes of other Parts, serves only to recover the Tone after any violent Distension.

Inward
Tunic.

The *Inner Tunic* is *Nervous*. It is thin, and in the *Fundus Uteri* smooth, but in and about the Neck very much wrinkled, and pierc'd with abundance of little Holes,
like

like the Mouths of Ducts, out of which, upon pressing, issues a clear, ropy Liquor, which probably is that which seals up the Mouth of the Womb, in the time of *Gestation*.

The *Uterus* is connected by its Neck to the *Vagina*, behind by its outward common Membrane, and before by the same to the *Vesica Urinaria*. Its sides are ty'd to other parts, but the *Fundus* of it is left loose, that it may expand and dilate with more freedom, according to particular Exigencies.

The *Ligaments* are in Number four, two of them call'd the *Broad Ligaments*, and two *Round* from their Figure.

The *Broad Ligaments* are Membranous, and arise from the *Proceffus* of the *Peritoneum*, from which they branch off about the Loins, and are fastned to the sides of the *Uterus* and *Vagina*, and serve to prevent their falling down. They contribute likewise towards the sustaining the *Ovaria*, the *Tuba Fallopiana*, and other Vessels, which they, as it were, embrace.

The *Round Ligaments* arise from the sides of the Womb, at the place where the *Tuba Fallopiana* are joyn'd to it. At their first rise they likewise are broad, but by degrees, as they recede farther from the Womb, they grow round and smooth. And as the Sper-

mattick Vessels do in Men, pass betwixt the Duplicature of the *Peritoneum*, and so out of the *Abdomen* through the *Foramina* of the Oblique and Transverse Muscles of the *Abdomen*, then running obliquely upon the *Os Pubis*, they there terminate under the Fat near the *Clitoris*. By the Passages of these Ligaments, Women and Girls especially are expos'd to Inguinal Ruptures, as Men are by the Passages of the Spermatick Vessels.

Sub-
stance of
the Liga-
ments.

Broad.

Tab. viii
& x,

The *Substance* of the Broad Ligaments is Membranous, loose and soft, whence they have been compar'd by some to the Wings of *Bats*, and call'd *Ala Vespertilionum*; and from the Intertexture of some Fibres, others have mistakenly fancy'd them to be *Muscles*. After hard Labour, and a forc'd Delivery, these Ligaments are sometimes over-strain'd so far, as not to recover their Tone, whence follows a Propendence at the *Pudendum*, which is term'd *Prolapsus Uteri*. But whether properly so call'd, and that Appearance be a real *Prolapsus* of the *Uterus*, or only a Dilatation, and Propendence of the *Vagina* only, as some would have it, is an enquiry not of this place.

Round.

Tab. x.

The *Round Ligaments* are of a firmer Texture, and consist of a double Membrane, wrapping up in it *Arteries*, *Veins*, *Nerves* and

and *Lymphaducts*, intermix'd with Fleſhy Fibres, whence ſome have miſtaken theſe alſo for Muſcles. The Blood-Veſſels and Nerves, both in theſe and the Broad Ligaments, are numerous, and make up a great Part of what is call'd their Subſtance. Theſe, as the others, ſerve to keep the Womb in its right Poſition, and are capable of being injur'd, by the Violence of Unſkilful Midwives, in haſty, forc'd Deliveries.

By theſe Ligaments the *Uterus* is kept ſo tight in its proper Situation, that no Violence of internal *Flatus* or Humours, can raiſe it above its place. For as *De Graaf* obſerves, a Man pulling with both Hands, with all his Strength, cannot raiſe it above the *Os Sacrum*. This makes appear the Vanity of that Opinion which ſome have maintain'd after the great *Hippocrates*: That in *Hysterick Paſſions*, as they are improperly call'd, the *Uterus* riſes, and preſſing upon the *Stomach* and *Diaphragm* cauſes that Senſe of *Suffocation* which Women feel in ſuch Affections: An Error pardonable in the Times of that great Philoſopher, when Anatomy was but rude, but not to be forgiven in Modern Phyſicians, who have the Means of knowing at the Expence of others Labour, (if they would take the Pains to read,) the Abſurdity and Impoſſibility of that Notion.

Hysterick Paſſions.

On

Tubæ
Fallopianæ.

Tab. viii,
ix, x.

Expan-
sum Foli-
aceum.

Mem-
branes.

On each side of the *Fundus* of the Womb arises a *Duct*, which opens into the Womb with a very small Orifice, scarce admitting a small Stile, or a Knitting-Needle, but in its Progress its Capacity grows greater, being large enough to admit the end of a Man's little Finger, and towards the end is contracted, and grows small again. At the end next the *Ovaria*, which is at liberty, it is again expanded into a sort of *Foliage*, which is fring'd round with innumerable little Fibres, like a ragged Fringe, which Expansion, when open'd, was thought, by *Fallopins* the first Describer, to resemble the end of a Trumpet, and therefore the whole Duct was by him nam'd *Tuba*.

It consists of a double *Membrane*, the outward smooth and even, deriv'd from the common Membrane of the *Uterus*. The Inner, which springs from the inner Membrane of the Womb, is very much corrugated, more especially at the Extremities. That farthest from the Womb at the time of Impregnation, at which time the whole *Tube* is expanded, reaches to, and embraces the *Ovary*: At other times it seems to fall a little short of it, and is only slightly ty'd by a thin Membrane, reaching from the under part of the *Expansum Foliaceum*, to the under side of the *Ovary*. These *Tubes* are about five or six Fingers breadth long.

Both

Both *Arteries* and *Veins* are very numerous here, especially the latter, which by their Structure
 Ramifications and Contortions make the main Substance of them, which is a kind of Tab. x.
Reticular or *Cavernous* Body, consisting al- Fig. ii.
 most wholly of Blood-Vessels, not unlike that of the *Pudendum*, or *Clitoris*, before describ'd. This Structure makes it capable of Dilatation and Contraction, according to the Quantity and Stop of the Irruent Blood, and consequently of being Erected (if I may use that Term) *in Coitu*, and of embracing the *Ovarium* at that time, which in its State of Flaccidity it did not reach.

Dr. *Wharton* has ascrib'd *Valves* to them, No Val-
 and others have divided them into *Cells*: ves, nor
 But tho' both are to be found in the *Cornua* Cells.
Uteri of some Brutes, they are not to be met with in the *Tubes* of Women, which have but one Cavity a little dilated in the middle, and no *Valves*.

Near the ends of these *Tubes*, about two Ovaria.
 Fingers distance from the *Uterus*, lie the Tab. x.
Ovaries, or *Testes Muliebres*, so call'd from their Use, which was formerly suppos'd to be analogous to that of the Testicles in Men.

They are connected to the Womb by a Conne-
 strong Ligament, call'd by many Anatomists tion.
Vas Deferens, upon Supposition that it was a Vessel which convey'd the Seed to the Womb, and in some measure likewise by
 the

the *Tuba Fallopiana*, and by the *Broad Ligament*. About the Region of the *Os Ilium*, they are fasten'd to the *Peritoneum* by means of the *Spermatick Vessels*, and the *Membranes* which cover them, by all which the *Ovaries* are kept suspended about the same height with the *Fundus Uteri* in Women not Pregnant. In Pregnants they rise along with the *Uterus*, but not quite so high as that does in the last Months of Gestation.

Figure.

Their *Figure* is not so round as the Male *Testes*, but is a kind of Semi-oval: Gibbous on one side, and depress'd on the other, with a *Superficies* something uneven, through the unequal *Protuberance* of the *Ova* which they contain.

Magni-
tude.

They are of different *Magnitudes* in the different Stages of Life. At the time of *Puberty*, when they are at their largest, they weigh ordinarily about a Dram and an half, and are about half the bigness of a Man's Testicle. In the Flower of Age they are Plump and Succulent, but as Age comes on, they wither and shrink by degrees, and grow hard and dry, so as sometimes at last to weigh not above a Scruple. Some Anatomists have affirm'd, that these, as Glandulous Parts, like the *Thymus*, were bigger in Infants, and decrease gradually after Birth; but *De Graaf*, who weigh'd many of those of new-born Children, says,
he

he never found them weigh otherwise than between five and ten Grains.

They are cover'd externally with a common *Membrane* from the *Peritoneum*, to which some add a proper *Membrane*. Membrane.

The *Membrane* being taken away, the *Substance* appears whitish, compos'd of a multitude of thin little *Membranes*, and slender *Fibres*, interwoven with a great Number of *Arteries*, *Veins* and *Nerves*.

Among these *Fibres*, *Membranes* and *Ova*. Vessels, are found interspers'd a number of little round Bodies, like Bladders, full of a limpid Substance like the White of an Egg, which boyl'd acquire the same Colour, Taste, and Consistence, with a boyl'd White of an Egg, from which Similitude, as well as from the Analogy of their Use, (being taken for the material Principle of Generation,) they are now commonly call'd *Ova* or Eggs, and the *Testes* in which they are contain'd *Ovaries*. Tab. x.
Fig. i. N.

These Eggs are of very different *Magnitudes* in the same *Ovary*, tho' the biggest in a Woman seldom equals the size of a white Pea. They are so numerous, that *De Graaf* has told above twenty in one *Ovary*. These Eggs have been found by Anatomists in the *Ovaries* of almost all sorts of Animals, and are not doubted to exist in the Females of all sorts of Animals whatsoever. Magni-
tude.

Besides

Hydati-
des.
Vide
Tab. ix.
Fig. i. e.

Besides these Eggs, there are sometimes found another sort of watry Bladders, which are suppos'd to be preternaturally there, because they are found but now and then, and sometimes bigger than the Eggs themselves. These are call'd *Hydatides*, and are probably the beginning of a *Dropfy*, commenc'd in this Part by the Eggs, and perhaps are no other than the *Hydropical Eggs* themselves.

An Hy-
dropical
Diffecti-
on.

It is not unlikely that all those *Dropfies* of the Belly which Women labour with under the fallacious Name of *Tympanies*, have their first rise in these Parts. I have been present at the opening of several, and have always found the *Ovaria* distended with Water to an incredible Magnitude (tho' not always equally on either side) but especially in one, when a Gallon or more of Water was taken out of one *Testicle*, and the Membranes of the *Testicles*, after the Water taken out, so enlarg'd and thicken'd, that it appear'd by Hand to weigh some Pounds, but not having weigh'd it in *Scales*, we cannot tell the exact weight of it.

Blood-
Vessels.

Superior.

Tab. viii,
ix, x.
Fig. i.

The *Blood-Vessels* that go to the *Uterus*, and the appending Parts, are divided into Superior and Inferior. The SUPERIOR are the same that are call'd in Men the *Spermatica*, and *Vasa Preparantia*, and have their Origines from, and Exit into the
Aorta

Aorta and *Cava*, as the Vessels of Men have. But not being sent out of the *Abdomen*, their course is shorter. The Branches which they distribute into the *Uterus* and *Vagina*, are larger and more in number, than those that go to the *Tuba Fallopiana* and *Ovaria*.

The INFERIOR are Branches of the Inferior. *Hypogastricks* and *Hamorrhoidals*, and only scatter themselves upon the lower part Tab. x. of the *Vagina*. Those before mention'd Fig. i. are pretty large, and are distributed all over the *Vagina* and *Uterus*, running after an irregular manner with abundance of Contortions, and joyning very apparently by perfect *Anastomoses*, *Arteries* with *Arteries*, and *Veins* with *Veins*, as blowing into them, or Injections with any Liquor shew, especially the Injections of Wax.

But in the times of Gestation these Vessels grow very large, and plainly shew, even without Injection, their Communication; some of them being large enough to admit of a Swans Quill. Distended in the time of Gestation. Tab. viii, x.

They receive *Nerves* from the *Par Vagum*, and from the *Cauda Equina* in the *Os Sacrum*. Fig. i. Nerves.

Monsieur *Nuck* has given us an Accurate Description of the *Lymphæducts* of the *Ovaria*, in his *Adenographia Curiosa & Uteri Fæminei Anatome Nova*: They arise Lymphæducts.

arise from the Surface of the *Ovaria* by several Branches, which unite and make three Branches on each side, and partly empty themselves into the *Lymphatick Glands* below the *Emulgent Vessels*, whence other exporting *Lymphaducts* arise, and empty themselves into the *Receptaculum Chyli*; others empty themselves immediately into the *Receptaculum*.

T A B.

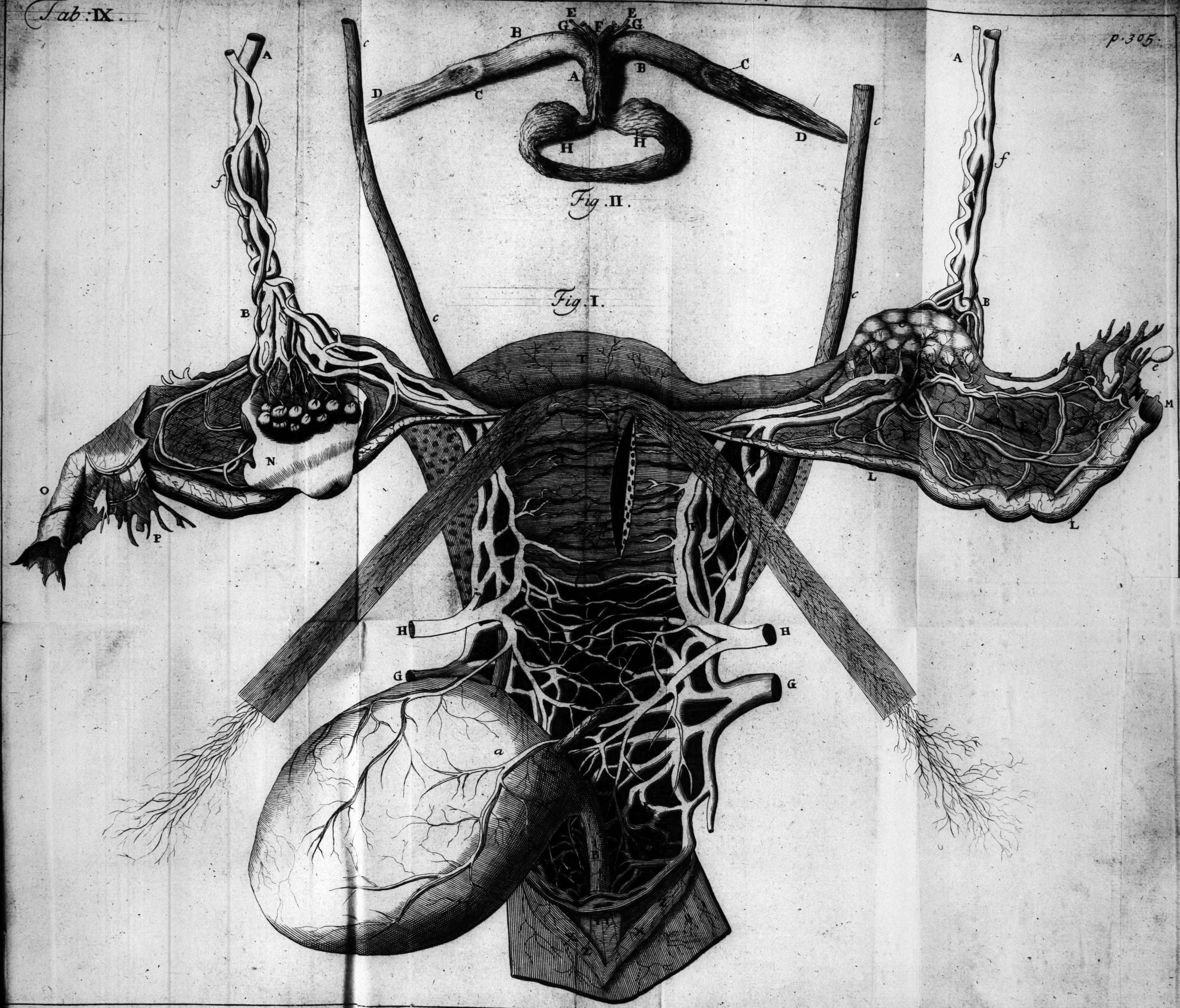


Fig. II.

Fig. I.

T A B. IX.

F I G. I.

From Swammerdam.

Shews the *Uterus* of a *Virgin*.**AA**, The *Spermatick Vessels* from their Rise to their Dissemination through the *Ovaria*, *Tubes* and *Fundus Uteri*.**BB**, The *Corpus Pyramidale* on each side compos'd of Branches of the *Spermatick Artery* and *Vein*.**C**, The left *Testicle* or *Ovary* cover'd with its proper Membrane, through which Eggs appear protuberant.**D**, The Distribution of the *Spermatick Artery* and *Vein* upon the left *Ovary*.**EEEE**, The Branches of the same Vessels marching over the *Membraneous Ligaments*, or *Alæ Vesperilionum*, to the *Tube* on each side.**FFFF**, The *Spermatick* and *Hypogastrick Vessels*, which run curling together along the sides of the Neck of the *Uterus* under the *Tubes* and *Round Ligaments*, and inosculate freely on each side.**GG**, The *Hypogastrick Veins*.**HH**, The *Hypogastrick Arteries*.**IIII**, The *Anastomoses* of the Arteries express'd.**KKK**, The various *Implications* and numerous *Inosculations* of the Vessels finely express'd.**LL**, The left *Tube* or *Horn* of the *Womb*.**M**, The *Aperture* of the *Tube* display'd with its Fringe resembling the tatter'd edges of a worn Cloth.**N**, The *Membrane* of the *Testis* separated, and turn'd back to shew the *Ova* and the *Spermatick Vessels* going to and from them.**O**, The right *Tube* inverted to shew its Capacity through which the *Ova* descend to the *Uterus*.**P**, The Fringe of the right *Tube*.**Q**, The *Fundus* of the *Womb* obscurely protuberant.**R**, A *Slit* in the Body of the *Womb*.**S**, The *Substance* of the *Womb*, in which appear the *Orifices* of the *Blood-Vessels* cut transversely.

X

T, Part

T, Part of the *Membrane* covering the *Intestinum Rectum*.

VV, The *Round Ligaments*, which are nothing but the *Arteries* and *Veins* which go to the *Clitoris* and *Pubes*, wrapp'd up in their proper *Involucrum* or *Tunic*.

XX, *Crura Clitoridis*, or its *Divarications*, call'd by *Swammerdam Crura Externa*.

YY, The *Cavernous Bodies* of the *Uterus* taken notice of by *De Graaf* under the name of *Plexus Reticularis*, but here call'd *Crura Clitoridis Interna*.

ZZ, The *Vessels* of the *Clitoris*:

a, The *Bladder* of *Urine* turn'd toward the right side.

B, The *Insertion* of the *Neck* of the *Bladder* near the *Clitoris*.

CCCCC, The *Ureters*.

dd, The *Insertion* of the *Ureters* into the *Bladder*.

ee, A *Hydatis*.

ff, The *Valves* of the *Veins*.

F I G. II.

A, THE Body of the *Clitoris* distended with *Wind*, as it is with *Blood* in *Coitu*:

BB, Its *Crura* also distended.

CC, The *Extremities* of the *Corpora Cavernosa* of its *Crura* cut from the *Ossa Pubis*.

DD, The *Musculi Erectores Clitoridis* freed from the *Ossa Coxendicis*, and left at their *Terminations*.

EE, The *Arteries*.

F, The great *Vein*.

GG, The *Nerves* of the *Clitoris*, which pass likewise to the *Corpus Cavernosum Pudendi*.

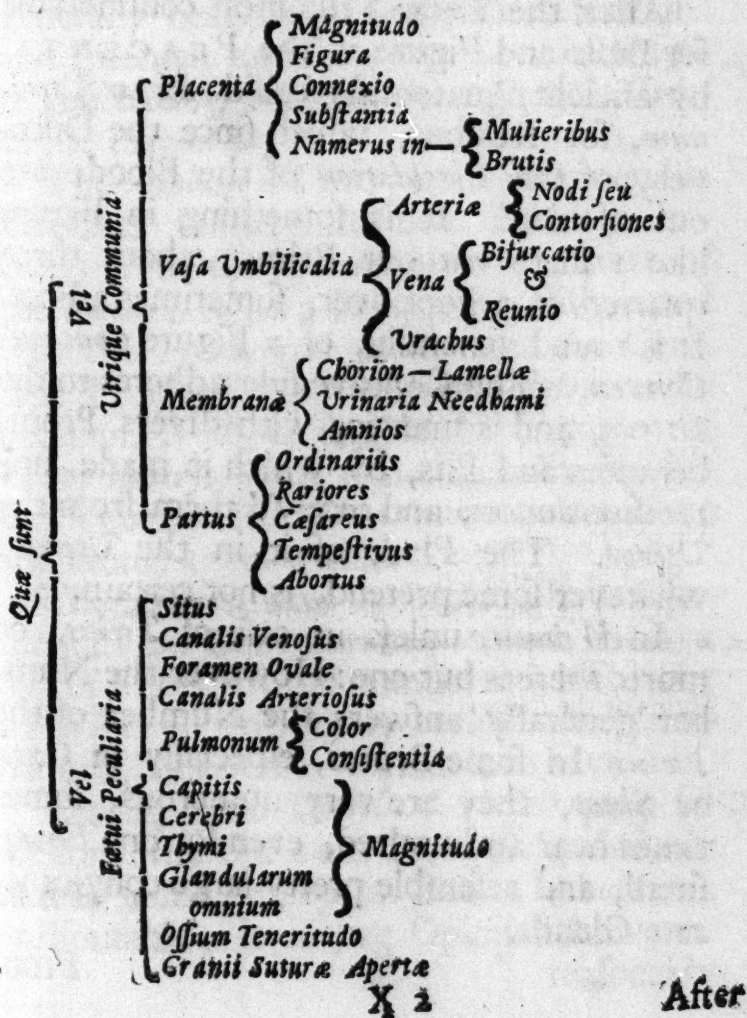
HH, The *Corpus Cavernosum Pudendi* inflated by the *Veins* of the *Clitoris* F.

C H A P. XXIII.

*Of the Placenta Uterina, The Umbilical Vessels,
The Membranes that involve the Fœtus, and the
Liquors that they contain, The Situation of the
Fœtus in the Womb, The Legitimate Time,
The Nourishment of the Fœtus, The Difference
between a Fœtus before Birth and after.*

SYLLABUS.

*Eorum quæ conspiciuntur in solis GRAVIDIS
& FœTU.*



After *Impregnation* there is a new Production of Parts, that exist only during the time of *Gestation*, and afterwards are either discharg'd, or dry up and disappear.

Of these the *Principal* is the *Fætus*, for the sake and use of which, all the rest are form'd. But of that more hereafter.

After the *Fætus*, the most considerable Placenta. for Bulk and Figure is the *PLACENTA*, by ancient Anatomists call'd *Hepar Uterinum*, for Reasons, which since the Discovery of the *Circulation* of the Blood, are out of date. It is something in Figure like a Plate without Brims, about three quarters of a Foot over, sometimes a Foot. It is round generally, of a Figure *Concave-Convex*. The Concave side adheres to the *Uterus*, and is uneven, with divers Protuberances and Pits, by which it made Impressions upon, and receiv'd them from the *Uterus*. The Place of it in the *Uterus*, whatever some pretend, is not certain.

Number. In *Women*, unless in case of *Twins*, or more, there is but one: However the Number generally answers the Number of the *Fætus*. In some Brutes, especially in *Oxen* or *Sheep*, they are very numerous, sometimes near an hundred, even for one *Fætus*. small, and resemble pretty large conglomerate Glands.

From

From the External or Concave side, which likewise has its Protuberances, tho' ^{Umbilical} cover'd with a smooth Membrane, issue the **UMBILICAL VESSELS**, which are in great Plenty distributed through the whole Substance of it.

The *Umbilical Vessels* are two *Arteries* a *Vein*, and the *Urachus*.

The **ARTERIES** arise from the *Iliacks*, ^{Arteries.} generally near their division into External and Internal, and thence pass on each side of the *Urinary Bladder* through the *Navel* to the *Placenta*.

The *Umbilical Vein*, from innumerable ^{Vein.} Capillars united into one Trunk, descends from the *Placenta* to the Liver of the *Fætus*, where it is partly distributed into the *Porta*, and partly into the *Cava*. The Trunk of this *Vein*, answerable to the occasion, is above double the Capacity of either *Artery*. It is sometimes divided before it comes at the *Fætus* into two Branches, and united again within.

The *Arteries* have in several places Contortions or Convolutions, which form a sort of Knots, by the number of which, our *Midwives* superstitiously reckon the Number of Children the Woman is to have.

Among these *Umbilical Vessels* may be ^{Urachus.} reckon'd the **URACHUS**, which, tho' not plainly found, except in *Brutes*, where it is indisputable, is in my Opinion however

reasonably to be allow'd, tho' our Opportunities of Examination not being the same, it usually collapses, and grows so stiff before such Subjects come under our Examination, that we have not a fair Tryal; But the Necessity appearing to be the same, I can little more doubt the Existence of it, than in *Brutes*, where it is exhibited beyond contradiction.

Mem-
branes of
the Fœtus

To these Vessels are continued the *Membranes* which include the *Fœtus*, the Interior of which including the *Fœtus*, and the Liquor wherein it lies, is call'd *Amnios*, which is a white, soft, thin, transparent Membrane, containing in it a limpid Liquor, like a thin Gelly Broth; of which the Stomach of the *Fœtus* being always found full, it is probably, in part at least, the Matter of its Nourishment.

Membrana
Urinar-
ia.

On the outside of this is found a thin Humour, that in Consistence, and other Circumstances resembles Urine, which, according to Dr. *Needham*, is contain'd in a proper *Membrane*, which he calls *Membrana Urinaria*, and receives the discharge of that Liquor from the *Urachus*. But, Subjects proper for an Examination of this Particular being rare, Anatomists have doubted the Existence of this Membrane, and have chosen rather to make it a Duplicature only of the *Chorion*, and to leave the Liquor which it contains (which is no small quantity)

tity) unaccounted for, than to allow any thing analogous to the *Allantois* in Cows and Sheep, tho' the necessity appears to be the same. For this they give no other reason, than that the *Urachus* of a Humane *Fœtus* is not permeable by the *Flatus*, and that the Membrane, which Dr. Needham calls *Urinaria*, adheres in some places pretty closely to the *Chorion*. The first of which may happen generally, because such Subjects are not expos'd time enough to them to make a fair Inquiry. The latter carries no weight at all with it.

The outward *Membrane* of the **CHO-** Chorion;
RION, is a pretty thick, strong, whitish Membrane cover'd with a multitude of Branches of Veins and Arteries. It is divisible into two *Lamellæ*, whereof the outermost is thick and opaque, the inner thin and transparent. Those that deny the *Urinary Membrane* divide it into three. The innermost of which is as the outer, likewise pretty thick, contrary to the common Course of Nature, which is some Argument for its being a distinct Membrane.

Some Anatomists have pretended to give an account of the Posture of the *Fœtus* in the Womb at the several times of Gestation. But these are so very various and uncertain, that such accounts are little to be depended upon. In the first Months,

Situation
of the
Fœtus.

it is of no moment how it lies in the Womb, in the latter Months after the *Fetus* is grown not only Quick, but Robust, it frequently changes its Postures of it self, as not only the Mothers themselves feel, but any Body, by laying their Hands upon their Bellies, frequently may. However, their ordinary Posture is accounted to be sitting, with the Head uppermost, the Knees brought up between the Elbows, the Feet drawn back towards the Buttocks, the Hands clos'd below the Knees, and the Head dropping, with the Nose, as it were, between the Knees.

Birth.

When the time of *Birth* draws very near, it generally turns it self, and, preserving as to the rest near the same Posture, presents the Head to the *Os Uteri*, which is the most easie and natural Posture for *Delivery*. When the *Midwives* find it thus offering, they say it lies right. Sometimes it presents the *Feet* first, and this way Women are deliver'd, but with great Difficulty and Pain. Sometimes likewise it lies a-cross, offering either a *Hand*, a *Foot*, a *Knee*, or an *Elbow*, and this way *Delivery* is impracticable, and unless the *Midwife* has the Address and Skill to turn it, as they boast that they do sometimes, either Mother or Child, or both, must be lost. In this deplorable Case, the Life of the Mother is generally preferr'd to that
of

of the Child, and the Child, by means of Instruments, has been brought away by Piece-meal.

Sometimes the Child dies in the Womb, which if not timely discover'd, and brought away, the Mother runs great hazard. This sort of *Births* is not inconsistent with the safety of the Mother. *Bartholin* in a Book *De Insolitis Partus Viis* relates a great many stupendious Cases of Children dead and putrify'd in the Womb, the Parts of which have made their way through *Apostemations*, one whereof at the *Navel* was some Years in coming away, some Bones being discharg'd at long distant times, and making up in all, as he judges, sufficient for the *Skeleton* of *Twins*.

Something like this happen'd to a Gentlewoman of my Acquaintance, who receiving a great Fright after she was twenty Weeks gone with *Twins*, found her Belly insensibly to begin to sink on one side, and at length to grow very cold, flaccid, and flat, whilst the other side continued to swell and increase, till the due time of Delivery, when she was deliver'd of a Live Child. With it came away abundance of foetid, putrify'd, black, and other colour'd Matter mix'd with the Bones of a Child, which dy'd at the time of that Fright, and remain'd corrupting in the Womb, till the time of Delivery. The *Placenta* of the Child

Delivery
through an
Aposte-
mation.

A putre-
fy'd Fœ-
tus, and a
living one,
kept toge-
ther some
Months in
the Womb.

Child which was born alive, was very black, discolour'd, and in some measure putrefy'd likewise. The Child however grew up to be a Woman, and is now alive and bears Children, but has been from her Cradle obnoxious to *Scrofulous Tumours, Ulcerations, Cutaneous Eruptions* and *Swellings*. It is probable the Infirmary, to which this *Gentlewoman* is obnoxious, is owing to a Taint receiv'd from that unhappy *Bedfellow* in the Womb.

Partus
Cæsareus

It happens sometimes likewise that the Mother dies the Child yet living and vigorous in the Womb. In this Case without Scruple or Delay the Womb is to be cut open, by which means the Life of many Children has been sav'd, and some not yet come to Maturity for a *Natural Birth*. This way our *Edward the Sixth* was brought into the World, and *Julius Cæsar*, from whom it has been ever since call'd *Partus Cæsareus*.

Time.

The *Legitimate Time* of the *Birth* has been much controverted, tho' common Observation shews it to be about Forty Weeks from the *Time* of *Impregnation*, and tho' very frequent Instances of those that go longer, or come sooner are pretended, yet I believe this to proceed rather from the mistaken Accounts of the Women themselves, than from any Variation in Nature. We do indeed not only read of, but frequently see

see Births of *Seven* and *Eight* Months, but these may be reckon'd among the untimely *Deliveries*, and the Child is seldom or never Mature, if there has been no Fallacy in the Reckoning. All Creatures have a stated Period for bringing their Young into the World at Maturity, and why it should be otherwise in Women, no Reason appears.

How the *Fœtus* is *Nourish'd* in the Womb, has been a Question as much agitated among Anatomists as any whatsoever. Some contend that it is nourish'd by the Mouth, others will have it to receive its increase, and to grow like a *Vegetable* from the Mother, as from the Root, of which the *Umbilical Vessels* are the Stem, and the Child the Head, or Fruit of this *Plant-Animal*, if I may use that Expression. But this Question, and some others, we shall wave here, as containing something of curious Argument, and deserving a more particular Discussion.

There are some *Differences* in the *Structure*, *Mechanism* and *Proportion* of the *Parts* of a *Fœtus*, from those of an *Adult*, of which the Principal are those about the *Umbilical Vessels* and *Liver*, and those about the *Heart* and *Lungs*. The most apparent of these, is the *Funiculus Umbilicalis*, which is a Part that at the Birth is either broken, or cut away to the *Navel*. Here are two *Arteries*,

Nourishment of the Fœtus

Difference of the Fœtus before and after Birth.

Arteries, and a *Vein* and *Urachus*, which after Birth, become perfectly useless as Vessels, and drying, become impervious, and serve only as *Ligaments* to suspend the *Liver*.

Canalis
Venosus.

In the *Liver* it self is the *Canalis Venosus*, which in a *Foetus* maintains a Communication between the *Porta* and *Cava*, but after Birth dries up by degrees.

Foramen
Ovale,
Canalis,
Arterio-
fus.

In, and at the *Heart*, are the *Foramen Ovale*, and *Canalis Arteriosus*, both which serve to maintain the *Circulation* of the Blood, and to divert it from the *Lungs*, which in a *Foetus* are idle and useless, and of a darker Colour, and closer Consistence, than after they have been breath'd into, as appears by their swimming in Water after Birth, which they will not before do. This difference in the *Lungs*, affords an useful Experiment, in case of the suspected *Murder* of *Children*, for if they were *Still-born*, the *Lungs* sink in Water; If born alive, they swim. The afore-nam'd Channels serve only for the use of a *Foetus*, to prevent that Obstruction the Blood would otherwise have within the *Lungs* before they have been open'd. After Breathing has open'd the *Lungs*, the Blood takes its course through them, and these Passages close up.

Head.

The *Head* is much bigger in Proportion to the rest of the *Body* than afterwards;
The

The *Bones* are softer, and the *Sutures* unclos'd, leaving a great Space on the top of the *Head*, cover'd only with the *Membrane*, which is afterwards clos'd up with the *Bones*.

The *Thymus*, and *Glandula Renales* are Thymus, Glandulae Renales. considerably larger than afterwards, for it does not increase in Proportion to the Age of the Person.

Most other *Glands* are likewise bigger Brain. and softer, as the *Brain* it self is.

There are other Differences which are of no great moment, and therefore not necessary to be mention'd here.

T A B.

T A B. X.

F I G. I.

From Swammerdam.

Shews the Back Prospect of the *Uterus* of a Woman after Delivery.

AA, The *Spermatick Arteries*.

BB, The *Spermatick Veins*, which after sending a number of Branches to the *Ovaria* and *Fallopian Tubes*, have divers notable *Anastomoses* with the *Hypogastrick Arteries* and *Veins* about the Neck of the *Uterus*.

CC, The *Arteries* and *Veins* that form on each side the *Corpus Pyramidale*.

D, The Left *Testis* or *Ovarium* cover'd with its proper *Membrane*.

E, The Proper *Membrane* of the Right *Ovarium* open'd and expanded to shew the Distribution of *Arteries* into the *Ova*, of which a few only of the least are here figur'd, that they may appear more distinct.

FF, The *Membranous* or *Broad Ligaments* of the *Womb*, call'd *Ala Vespertilionum*, which the *Spermatick Vessels* traverse in their way to the *Tubes*.

GG, The *Cornua*, or *Tuba Uteri* reaching from the *Fundas* of the *Matrix* to the *Ovaria*, and serving for the Conveyance of the *Ova* from thence to the *Uterus*.

HH, The *Round Ligaments* of the *Womb* on each side.

I, The *Rise* of the *Arteries* and *Veins* of the *Round Ligaments* on the Left side.

K, A *Valve*.

LL, The two *Hypogastrick Arteries*.

MM. The

MM, The *Hypogastrick Veins*.

N, The Body, or *Fundus Uteri*.

O, The Neck of the *Uterus*.

PPP, The *Arteries* on the Body of the *Uterus* turn'd spirally like the Tendrils of a Vine.

QQ, Numerous *Veins* of the *Uterus* appearing prominent through the Exterior Membrane, and shewing divers *Anastomoses* scatter'd up and down.

RR, The *Vulva*, or *Vagina Uteri* reaching from the outward *Ostium* of the *Pudendum* to the inward one of the *Matrix*.

SS, The *Urethra*, or *Proper Channel* of the *Urine* cut off near the *Pudendum* together with the *Vagina*.

TT, The lower Surface of the *Bladder* of *Urine*.

VV, The *Ureters* descending to the *Bladder*.

Y, A piece of the *Urachus*.

ZZ, The *Umbilical Arteries*.

FIG. II.

ONE of the *Fallopian Tubes* with its *Blood-Vessels* fill'd with Quicksilver and Wind, to shew their Progress on one of the *Ala Vespertilionum*, with the *Reticular* distribution of the *Veins* on the *Parietes* of the *Tube* and its *Foliated Expansion*; whereby these parts become distended, and are render'd capable each of embracing the *Ovarium* on their own side, in order to convey the *Semen Masculinum* from the *Uterus*, as well as to transmit the *Impregnated Ovum* afterwards to its *Fundus*.

A, That part of the *Tube* next the *Uterus*.

B, Its

B, Its other Extremity, which is a little contracted before it makes its *Foliated Expansions*.

CC, Its *Foliated Expansions* here distended with Wind, as they are with Blood in *Coitu*.

D, The Orifice at the Extremity of the Tube dilated.

E, One of the *Ala Vespertilionum* with its

F, *Veins* and *Arteries* continued from the *Hypogastricks* of the *Uterus*; the former, *i. e.*

G, The *Veins* making a *Cavernous* or *Reticulated Body* on the sides of the Tube.

CHAP.

Fig: I.

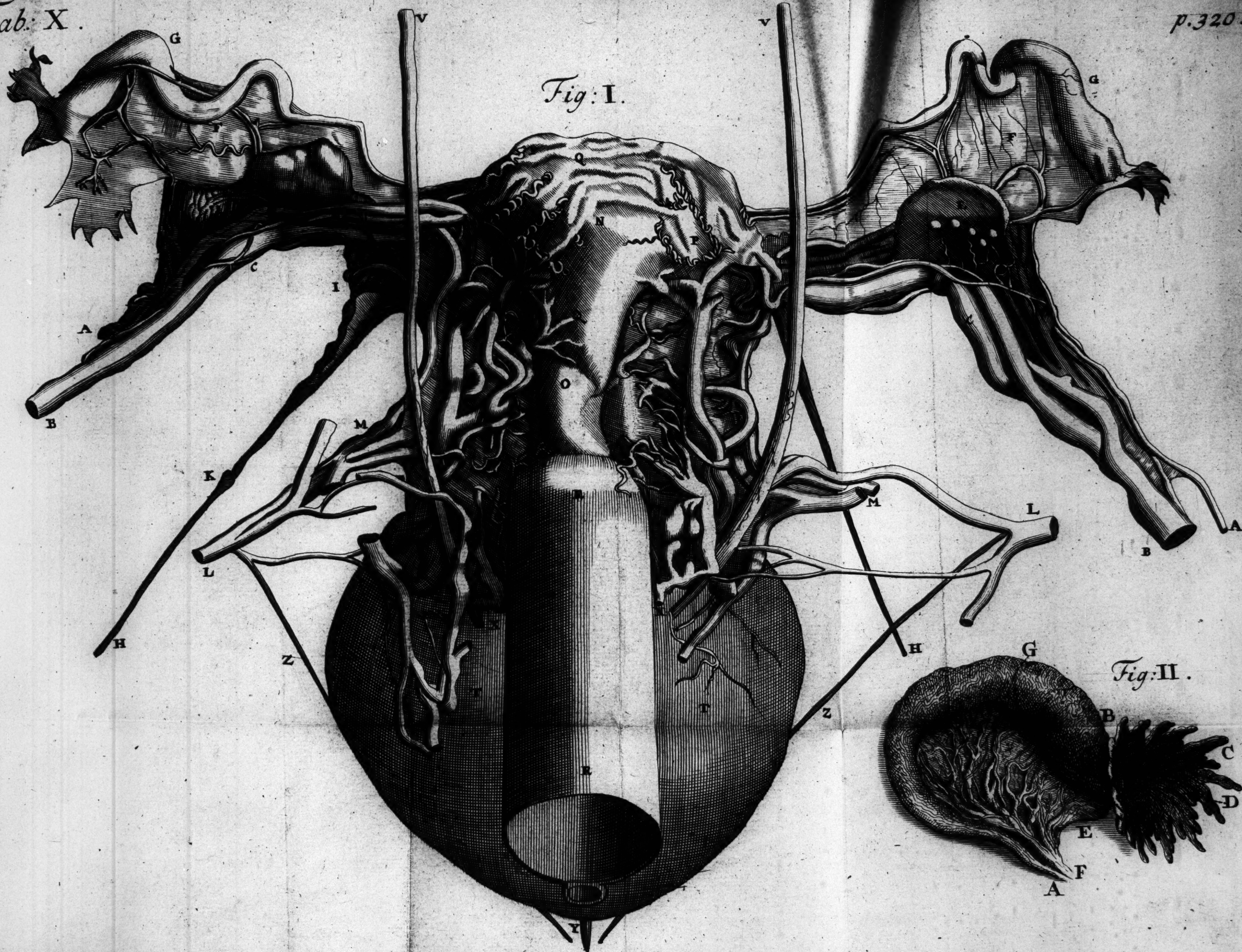
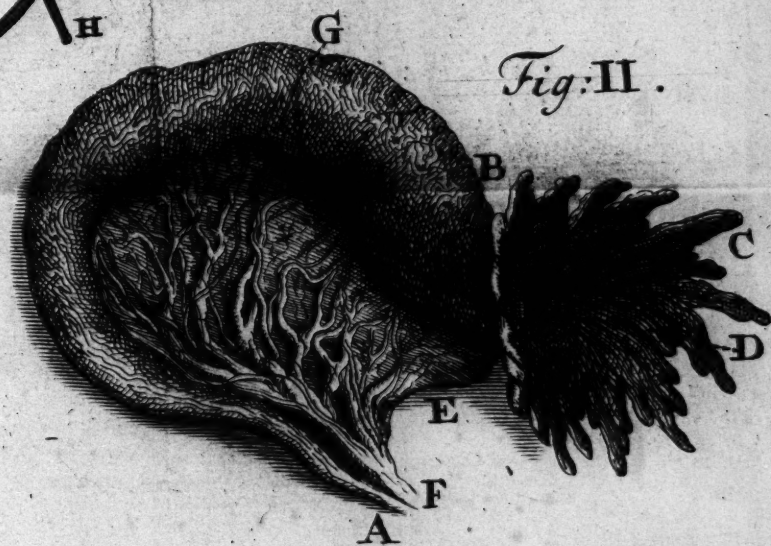


Fig: II.



C H A P. XXIV.

Of the Catamenia, or Menfes.

THE *Periodical Purgations* of Women Great Differences among Authors.
 not with Child, or giving Suck, is
 a *Phænomenon* that has exercis'd the greatest
 Wits of the *Faculty*, who after many learned
 Arguments, and many ingenious *Hypo-*
theses, have not been able to come to any
 Agreement among themselves.

All Authors agree, that the necessity Final Cause.
 that Women have for some extraordinary
 Supply to recompence the Expence, and
 to support them under it during the time
 of *Gestation* was the final Reason, why
 this Redundance at other times was given
 to them.

But this is the only Point, wherein they
 are generally agreed. Some not content
 with that occasion alone, will have the
 Menstruous Blood to offend in *Quality*,
 more than *Quantity*, which they argue
 from the Pain it gives many Women in
 the Evacuation. They say likewise, that Fabulous Qualities
 the Malignity of them is so great, that
 they Excoriate the Parts of Men by the
 meer Contact; that the Breath of a Men-
 struous Woman will give a permanent
 Stain to Ivory, or a Looking-glass; that
 a little of this Blood drop'd upon a Vine,

Y

or

Domini-
on of the
Moon.

or Corn, or any other Vegetable, they become Steril or Blasted; that if a Woman with Child, be defil'd with the *Menses* of another Woman, she Miscarries; that if a Dog tastes them, he runs Mad; if a Man, he becomes Epileptick; which, with abundance of other such Fables, tho' recounted by many Grave, and some great Authors, I reject, as needing no Refutation, and have only recited them, to shew what things have been superstitiously taken up upon Credit, without sufficient Examination by Men of great Authority, who have been prevail'd upon to believe, what the Women at all times would laugh at. Another thing likewise, which we shall not bestow much time upon, is, the suppos'd Dominion of the Moon over the Bodies of Women in this case, a Fancy which anciently was the Universal Opinion, tho' common Experience, with a very little Reflection, might have shewn the Weakness of it. For if this Purgation had been caus'd by any Influence of the Moon, then all Women of the same Age and Temperament should be purg'd according to the same *Periods* and *Revolutions* of the Moon at the same time, which daily Experience shews to be false.

There are two Opinions however, that are argued with a great deal of Strength and Reason, both which allow the Quality
of

of the Blood to be Innocent, but they differ about the reason of its Issue. Dr. *Bohn*, and of late Mr. *Friend*, a learned ingenious Gentleman of *Oxford*, maintain that this *Flux* is the Result of a meer *Plethora*, and to be evacuated only for Relief against the Quantity.

Hypo-
theses
from a
Plethora.

Others are of Opinion, that this Evacuation is owing to a *Fermentation* rais'd at that time, and that the Eruption of the Blood in those Parts is the Effect of an Effervescence or Ebullition of the Blood. This Opinion has been maintain'd by many, but its chief Supporters are, the Learned Dr. *Charleton* here, the Ingenious Dr. *Bayle* Professor of *Physick* at *Tholouse*, and Dr. *De Graaf*, whom we have had so frequent occasion to mention.

Fermen-
tation.

The two first of these suppose a *Ferment* peculiar to the Women, which produces this *Flux*, and affects that part only, or at least principally. *De Graaf*, less particular in his Notion, only supposes an Effervescence of the Blood rais'd by some Ferment without assigning how it acts, or what it is.

Mr. *Friend* (who has sustain'd the Cause of a *Plethora* with the greatest Clearness and Strength) supposes that this *Plethora* arises from a *Coacervation* in the Blood-Vessels of a *Superfluity* of Aliment, which he thinks to remain over and above what

Mr.
Friend's
Hypothesis.

is excreted by the ordinary ways, and that Women have this *Plethora*, and not Men, because their Bodies are more humid, and their Vessels, especially the Extremities of them more slender, and their manner of Living generally more unactive than a Man's, and that these things concurring, are the occasion that Women do not perspire sufficiently to carry off the Superfluous Alimentary Parts, and that therefore this Overplus must be retain'd in the Vessels, till it be accumulated in such Quantity, as to distend the Vessels, and force its way through the *Capillary Arteries* of the *Uterus*. And he thinks this Discharge to happen in that Part, rather than in any other, because it is more favour'd by the Structure of the Vessels, the Arteries being very numerous, and the Veins very sinuous and winding, and therefore more apt to retard the *Impetus* of the Blood, and consequently in a *Plethorick* case, to occasion a Rupture of the Extremities of the Vessels, which may last, till by a sufficient Discharge, the Vessels are eas'd of their Overload.

This I take to be the Substance of that *learned, ingenious Gentleman's Hypothesis*, from whence he very *Mechanically*, and very *Philosophically*, deduces a *Rationale* of the *Symptoms*.

To

To this *Hypothesis* I could subscribe, did ^{Plethora} not many Observations convince me, that ^{not the} there is no such *Plethora*, or at least, that ^{cause of} it is not necessary to *Menstruation*: For if ^{Menstruation.} the *Menfes* were owing to a *Plethora* so accumulated, the Symptoms would arise gradually, and the Heaviness, Stiffness and Inactivity (necessary *Symptoms* of a *Plethora*) would be felt long before the *Absolution* of the *Period*, and Women would begin to be heavy and indispos'd soon after their Evacuation, and the *Symptoms* would encrease day by day. But this is contrary to all Experience, and many Women, who have *them* regularly and easily, have no warning, nor other Rule to prevent an indecent Surprise, than the Measure of the Time; in which some that have slipt, tho' otherwise modest and careful Women, have been put to such Confusions and Shifts, as would not consist with the Notice that a *Plethoric* Body would give.

But even in those who are difficultly this way purg'd, the *Symptoms*, tho' very vexatious and tedious, do not make such regular Approaches, as a gradual Accumulation necessarily requires: If we consider what ^{No gradual Accumulation of Matter.} violent Symptoms will come on in a Day, or an Hour, we shall be extremely puzzl'd to find out the mighty Accession of Matter, that should in an Hour or Days time make such great Alterations. According to this

Mr.
Friend's
Hypothe-
sis plausi-
ble.

Hypothesis, the last day contributes no more than the first, and consequently the Alteration should be no more sensible, excepting the bare *Eruption*: But it is neither my Business nor Intention to combat any Man's Opinion. The Learned Dr. *Bohn* has said a great deal; and Mr. *Friend* has rendred this *Opinion* so plausible, that I wish it were true; and must do him this Justice, that his is the first Account of the *Periodical* Revolution of the *Menses* that I have met with, *Philosophically* contriv'd, and like an understanding *Inquirer*. Most others have either given trifling or precarious Solutions, or past it over as a Difficulty beyond Humane Understanding.

Fermen-
tation not
prov'd.

The other *Hypothesis* of a Fermentation or Effervescence of the Blood has had much worse Luck: For either it has been slubber'd over as a thing whereof the *Fact* was certain, but the Reason inscrutable, as *De Graaf* has left it; or establish'd upon an *imaginary Ferment*, which never was prov'd to exist, and perhaps never will be.

No Re-
ceptacle
for Fer-
mentati-
on assign-
ed.

The sudden *Turgescence* of the Blood gave them reason to think, that it arose from something till then *extraneous* to the Blood: But where to find that they did not know; and therefore had recourse to the Parts suppos'd to be principally affected, and feign'd an *imaginary Ferment*, which no Anatomical Inquiry could ever shew, or affirm any

any reasonable Receptacle for, nor no Reasoning necessarily infer: But on the contrary, both *Autopsy*, and Reasonings from it conclude against it; since neither the Fermenting Matter it self, the Organs by which it should be secreted, nor the Place where it should be repositied are to be found.

However the *Heat*, which accompanies the *Turgescence* of the Blood, shews, that it is not meerly *Plethorical*, but that there is an extraordinary Intestine Motion at that time: Which is likewise confirm'd by the Operation of most Medicines conducing to that end, which are most of them such as will give a *Fermentative* Motion to the Blood; or such as will stop an extraordinary Flux of Humors another way, which is one of the ordinary Causes of a defect of the *Menfes*. For this Reason *Vitriolick*, and other *Restraining Medicines*, which are sometimes given with Success in Obstructions, as they are call'd, are not strictly to be reckon'd among the *Provocants*, but to the number of those that by rectifying the Tone of the Stomach and Intestines, stop extraordinary Fluxes that way, and by degrees mend and invigorate the Blood, which by such Discharges is impoverish'd.

The suddenness and violence of the Effervescence, which is such as to break out at the *Nose*, *Hemorrhoids*, *Lungs*, *Stomach*, *Eyes*, and indeed almost any part of the Bo-

Operation
of Em-
menago-
ges.

The neces-
sity of a
Recepta-
cle prov'd
from the
sudden-
ness of its
Symp-
toms.

dy, shews, that whatever is the Cause, it is something very active, and that may be introduc'd in quantity in a short time into the Blood; and consequently, that it must be ready gather'd in some Receptacle, where, while it was contain'd, its Action was prohibited. For, if it had been scatter'd in the Blood it self, it must either have acted constantly and regularly, and then no such *Critical* Evacuation could happen; or it must exert its Power gradually according to its increase in the Blood, and so the Symptoms must have approach'd in the same manner as we have argu'd against a *Plethora*

Gall-
Bladder
the Re-
ceptacle,
and Bile
the Fer-
ment,

The only Humour which I can find in the Body, so circumstantiated as this *Phænomon* seems to require, is the *Bile* contain'd in the *Gall-Bladder*. This is a *Liquor* that probably may have divers Uses, and produce many Effects in an Animal Body which are yet unobserv'd: But universal Experience agrees that it is capable of raising Disorders, or *Fermentations extraordinary*, whenever it insinuates it self in quantity into the Blood. And as it is contain'd in a peculiar Receptacle, which seems not to admit of a constant Issue, it may be there reserv'd, till in a certain Period of time the *Bladder* becoming turgent and full, thro' the Compression of the incumbent *Viscera*, it emits the *Gall*, which, by the way of the *Lacteals* insinuating it self into the Blood,
may

may raise that *Effervescence*, which occasions the *Aperture* of the *Uterine Arteries*.

All Observations agree, that Persons of a *Bilious* Constitution are either more plentifully, or more frequently purg'd this way; and I my self have observ'd divers *Bilious* Persons, who tho' obnoxious to a *Fluxus alvi*, which kept them far from a *Plethorick* Condition, were however vex'd with a *Menstruous Hypercatharsis*: And it is observable, that Men of *Bilious* Constitutions are more frequently troubled with the *Piles*, than others; and that Distempers manifestly *Bilious*, are attended with Symptoms resembling those of Women, who labour under difficult *Menstruation*: Their *Pulse* increases, their *Heads* ache, they *Vomit*, they have *Cholical Pains*, and feel a general *Fulness* and *Stiffness*, and are reliev'd in great measure by Bleeding from most of these *Symptoms*, which a *Critical Discharge* carries off.

It may be objected, That Men abound with *Bile* as well as Women: But to that Objection I take the liberty to answer, that they do not, nor with any other Humour that is permanent in the Body, *Semine excepto*. For as in Men the *Pores* of the Body are more open, and carry off more of the *Serous* part of the Blood, which is the Vehicle of all the other Humours; so consequently, a greater part of each of them

Farther
prov'd by
Observa-
tions on
Bilious
Constitu-
tions.

Women a-
bound with
Humours
of all sorts
more than
Men.

is

Why not
these Dis-
charges
in Men?

is discharg'd thro' them, than in Women; in whom the Superfluity must continue to circulate with the Blood, or be gather'd into proper Receptacles, which is the Case of the Bile.

Why not
in Brutes?

The same Argument which holds, Why *Menstruation* should not belong to Men? will hold likewise in Brutes; whose Pores are manifestly more open than those of Women, as appears by the Crop of Hair which they bear; for the Vegetation of which, a larger Cavity, and a wider Aperture of the Glands is necessary, than where no such thing is to be produc'd. Yet there is a difference in this Point between the *Males* and *Females*, even in them: These latter have their *Terms*, tho' not so often as Women, nor in the same Form or Quantity, though Blood sometimes be the result of them.

No satis-
factory
Reason yet
given, why
a more a-
crimonious
sort of
Bile should
be separa-
ted in a
Recep-
tacle.

No Anatomist, that I know of, has yet offer'd a satisfactory Reason, Why a sort of *Bile*, more thin and acrimonious, should be separated into a Receptacle by it self, and not constantly discharg'd, as that of the *Porus biliaris* is. They have generally refer'd it for the use of Chylification; but besides that it appears to be no proper Ingredient of so sweet a Juice as Chyle is, they have but precariously affirm'd it only, and have not given us any necessary, nor to me convincing Arguments, of its *Instrumentality* in that Case; nor indeed can I help saying,
that

that they have brought it without necessity into an Operation which might be compleat without it.

I think it unnecessary to apply this *Hypothesis* to the several *Phænomena* of the *Menfes*, whether in a natural, regular, or a diseased Case. The Solution of particular *Problems*, relating to this part of the Animal History, flows very readily and naturally from it; and whatever may be urg'd for the Power of a *Plethora*, or of any particular *Ferment*, may be apply'd without any straining to this. The only difficulty is, Whether the *Bile* be a sufficient Instrument to produce these Effects: And if it be, whether it does get into the Blood, as I conceive, I shall not swell this Work with Arguments to prove these two Points. For one I think is on all Hands confess'd, and the other I think reasonable to be believ'd. What I deliver, I lay down *Problematically*, with free Liberty to all Mankind to examin it impartially, and shall be as ready to receive the Truth, however contrary to my present Sentiments, as I am now to impart my own Opinion.

Not necessary to apply it to the Phænomena.

CHAP.

C H A P. XXV.

Of Generation.

*The Cause
of Gene-
ration not
sufficiently
accounted
for.*

THE *Organs of Generation* have been already describ'd: But there remain some Doubts about the efficient Causes of it, which are not sufficiently adjusted. It is agreed on all Hands, that there are in the *Ovaries of Women* little Eggs.

These Eggs, most *Modern Anatomists*, and the most Able till very lately, have maintain'd to be the *material* and *formal* Rudiments of the Body of the *future Man*, which the *Seed* of the *Male* did only impregnate and vivifie. But that the *Ovum* it self did, before Impregnation, formally and materially contain the Body of the *Man*, tho' it could not germinate and increase, till rendred Prolific by the *Seed* of the *Male*.

*Dr. Har-
vey's Opi-
nion con-
cerning it.*

This Opinion was first broach'd, and laid down with Strength of Reason, by our great Countryman *Dr. Harvey*, in his Book *De Generatione Animalium*. It procur'd almost universal Assent from the Writings of that Author; and seem'd perfectly establish'd by *De Graaf*, till the *Microscopical* Observations of *Mr. Lewenhook* grafted somewhat upon it, and took something from it.

*Mr. Lew-
enhook's
Opinion.*

That ingenious Gentleman, to whose happy Curiosity we are oblig'd for abundance

dance of useful Discoveries, pretends by his Microscopes, to have discover'd in the Seed of the Male, as well *Human*, as of divers sorts of *Animals*, innumerable extremely minute *Animalcles*, moving with great Vigor and Celerity in the Fluid; which he maintains to be Animals of the *Species* of that Creature whose the Seed is.

*Animal-
cula in
Semine.*

The Communication of his Observation, has mov'd the Curiosity of abundance of other Learned Men to make the same Inquiry, with such Glasses as he has describ'd; and by their own Acknowledgments, they appear to have done it with the same Success. I have had the same Curiosity; and must confess, that the Appearance answer'd beyond my Expectation, and came up to all the Representations that had been given of it.

*Farther
confirm'd
by Obser-
vation.*

The *Animalcles* (notwithstanding the very small compass the Eye can take in at once thro' such a Glas) appear'd in prodigious numbers, moving with great Velocity, diversly, and, as it seem'd, arbitrarily: Their Figure was exactly like that of *Tadpoles*, and they appear'd in the Liquor black like them, and about the size they are figur'd in the *Philosophical Transactions*, Num. 284. where a Description of them more at large may be found; what I have here said being sufficient for my purpose.

*Their Ap-
pearance.*

This

The Animal-
cule
the intire
Fœtus.

This *Discovery* has been the Foundation of a new *Theory* of *Generation*: In which this *Animalcule* is suppos'd to be the entire *Fœtus*, and the *Ovum* before-mentioned to be only a kind of *Matrix*, and to afford a *Pabulum* to the *Embryo*. For notwithstanding this *Discovery*, the Existence of true *Ova* in viviparous Females is not contested, nor is it indeed contestable.

These Hy-
potheses
under dif-
ficulties.

I should very readily go into this latter *Hypothesis*, if I did not meet with some insuperable Difficulties (to me at least they appear such) which equally press either *Hypothesis*. The first supposes the Animal to be entirely included in the *Ovum*, before Impregnation; and that the Seed of the Male does only vivifie, or give Life and Power of Vegetation, as we said before. The latter affirms the *Embryo* to be intire, perfect and alive in the Seed of the Male; and like the Seed of a Plant, to want only to be cast into a *Soil* or *Matrix*, proper for its Increase or Vegetation, which they suppose the *Ovum* to be.

Mongrel
Breeds an
Objection
against it.

But neither of these *Hypotheses* accounts fairly and fully for *mix'd Generation*: For besides the vast variety of *Mongrel Dogs*, begotten betwixt Sires of different *Species*, there have been abundance of Observations of Mixtures of Animals of more remote Kinds; such as between a *Pheasant-Cock* and a *Hen*: A *Bull* and a *Mare*; which has been often enough observ'd to procure a particular Name, and is call'd a *Gimar*: A *Cat* and a *Rat* (of which, however improbable it may seem, there is an Honourable Family that can produce abundance of Witnesses); A *Buck-Rabbit* and a *Guinea-Sow*; of which lately I have had a very Credible Account. But the most common of all these Animals

Animals of mix'd Breed (except the Dogs) is the *Mule*, begotten by an *Ass* upon a *Mare*.

If the *Ovum* contain'd the form'd Animal, then the *Fœtus* ought to follow the *Species* of the *Mother*, let the *Sire* be what it will: Because he contributes nothing but means of Life and Vegetation, the Animal being determin'd before-hand: And the *Kind* should be as certain as in *Plants*; where, let the Seed be thrown into what Soil soever, that does not alter the *Species* of the Plant, tho' it may the Growth and Vigor of it.

The Fœtus not following the Species of the Mother, shows the form'd Animal not to be contain'd in the Ovum.

The same Objection lies yet stronger against the *Animalcules*. For if that *Hypothesis* be true, the *Sperm* of an *Ass* is full of little *Asses*; and the being nurs'd by a *Mare* should never make *Mules* of them, because the *Species* is pre-determined, and the Creature not only form'd, but living. I might perhaps as reasonably object, the Similitude that the Children of the same Parents bear to their Ancestors; some to the Father's Line, and some to the Mother's: which plainly shews, that to the Determination of the *Species*, both Sexes concur; and that sometimes one may prevail, and sometimes the other; which could not be, if both these *Hypotheses* were strictly or absolutely true. I know some endeavour to get over this Objection, by fancying that the different *Matrix* may have so much effect, as to alter the Figure of the Animal so far, as may account for these mixt Appearances. But this is so poor, so un-philosophical a shift, that it is not worth an Answer; and they might with as good Authority persuade me, that an Orange-tree transplanted from *Sevil* to *England* would bear Apples; and so *vice versa*. It is a common Practice in Gardning, to graft one Fruit upon another Stock:

The same Objection to be urg'd against Animalcula in Semine.

But

But the Fruit still follows the Species of the Graft or Cyon, and bear like the Parent-Tree, not the Stock it grows upon.

A
Plastick
Power.

These Difficulties render both these *Hypotheses* unsatisfactory to me: and however old and exploded the Opinion of a *Plastick Power* on both sides be, I must however embrace it, even tho' I know not exactly wherein it lies; at least till I meet with somewhat more sufficient to resolve my Doubts than hitherto I have done.

A form'd
Animal
in the
Ovum not
prov'd.

It is however agreed, that tho' the *Ovum* of the Female does not formally contain the Animal, yet in Impregnation that it is a *Causa sine qua non*, and that Generation cannot be without an Egg rightly dispos'd: And upon that Concession (which I think is at this time universal) I shall proceed to examin some of the principal *Phænomena* of *Generation*, and the requisite Condition of Fœcundity, without concerning my self farther with the Animalcles of either side; except only to observe, that the Existence of a form'd Animal in the *Ovum* has never been prov'd, but suppos'd only from the Analogy it is imagin'd to bear to the Seed of Plants, in some of which the Figure of the Plant has by the Microscope been discover'd. The other *Hypothesis* seems to stand upon the Foot of Autopsy, but Reason, as we have observ'd, seems to be against it: And it is not impossible, but that these seeming *Animals* may be nothing more than some larger Particles of a mixt Fluid, whose Motion and different Figure the Microscope discovers to our Eye, while yet the minuter Parts will not discover themselves, even that way. But we leave these things to the Arbitrement of the Learned.

The seem-
ing Ani-
mals may
be only
Particles
of a
mixt Fluid
in motion.

A P P E N.





APPENDIX.

T A B. I.

FIG. III. *From Tho. Bartholin; the rest from Dr. Lower.*

FIG. I.

SHEWS the *left Ventricle* of the Heart with the *Trunk* of the *Vena Pulmonalis* opened on the back part, and expanded. *N. B.* this Figure is revers'd in this Print.

aa, The *Margin* of the *Vena Pulmonalis*, as it appears, when its *Trunk* is cut off and expanded.

bb, The *left Auricle* of the Heart.

c, The *Foramen Ovale*, by which the Blood in the *Fœtus*, and sometime after the Birth, passes from the right *Auricle* into the *Vena Pulmonalis*, and afterwards into the *left Ventricle* of the Heart.

dd, The two *Mitral Valves* which hinder the Blood from passing back into the *Vena Pulmonalis* when the Heart is in *Systole*.

ee, The *Columnæ carneæ* which appear on the sides of the *left Ventricle*, and are *Muscular Bodies* with *tendinous Fibres*, fastned to the lower *Margins* of the *Mitral Valves* dd, whereby those *Valves* are hindred from

rising, least the Blood should return into the *Pulmonick Vein*, when the Heart is in *Systole*.

F, The *Basis* of the Heart where the Blood passes from the *Pulmonick Vein* into the *left Ventricle*.

G, That part of the *left Ventricle*, which leads into the *Aorta*, behind the *Mitral Valve*.

H, The *Cone* of the Heart.

II, The *Contexture* of the *Carnous Fibres* in the *left Ventricle*.

FIG. II.

The inside of the right *Auricle* of the Heart, also revers'd in this Figure.

aaa, The *Basis* of the *Auricle* where it is united to the *Tendon* at the *Basis* of the Heart.

bbb, Its *Tendinous Circle* next the *Vena Cava*.

ccc, The *fleshy Fibres* which terminate in the two *Tendons*, a, b.

d, The *Orifice* of the great *Coronary vein* of the Heart.

ee, Two other *Orifices* of *lesser Veins* of the Heart, which
a bring

bring the Blood back from the Heart, and the *Parietes* of its Auricles and Trunks of the Blood, Vessels near the *Basis* of the Heart.

ff, The upper part of the Auricle.

FIG. III.

Shews the Heart cut transversely, so that both the Ventricles appear dissected; this Figure is also revers'd in this Print.

AA, The *Basis* of the Heart.

B, The right Auricle.

C, The left.

D, That part of the Heart next its *Cone* cut off.

EE, The right Ventricle of the Heart.

FF, The left.

GG, The *Septum* which parts the two Ventricles.

H, The Fat on the *Basis* of the Heart.

FIG. IV.

Shews the Insertions of the Fleishy Fibres of the Heart into the Tendons about the Orifices of the great Vessels.

a, The *Mouth* of the right Ventricle which receives the Blood from the *Vena Cava*:

b, That, by which the Blood is expell'd into the Lungs.

c, The *Ostium*, by which the right Ventricle receives the Blood from the Lungs.

d, The Orifice, by which the Blood is expell'd into the *Aorta*.

ffff, The fleshy Fibres which come from the external Surface of the Heart, and end in the Tendons of its *Basis*.

ggg, The internal Fibres of the Heart, which take a different course from the external, and end in the same Tendons.

FIG. V.

Shews the Outmost Carnous Fibres of the right Ventricle, which pass straight up.

AA, The *Basis*.

B, The *Cone* of the Heart.

CCC, The straight Fibres which pass from the *Basis* of the Heart.

FIG. VI.

The Fleishy Fibres, ascending from the right side towards the left, and are placed under the former.

A, The *Basis* of the Heart.

B, Its *Cone*.

C, The Fibres of the right ventricle.

D, Those of the left.

E, The Tendinous *Sinus* between the two Ventricles, in which the large Trunks of the Coronary vessels pass.

FIG. VII.

The Fibres passing obliquely, from the right side of the Heart towards the left.

A, The *Basis* of the Heart.

B, The *Cone*.

C, The right side.

D, The left.

E, The Fleishy Fibres of the right Ventricle, ending in the Tendon G.

F, The Fleishy Fibres also of the left Ventricle, passing into the same Tendon G.

FIG.

FIG. VIII.

Some of the short Fibres, which do not pass from the *Basis* of the Heart to the *Cone*, but about the middle of the sides of the Heart are presently inflected, and end in the Tendon of the other side, and in the Ventricle, in an oblique manner.

A, The Tendon about the Mouth of the right Ventricle.

B, The Tendon about the Mouth of the left Ventricle.

C, The Fibres continued from one Tendon to the other, with their intermediate Fibres which here and there mutually pass from one to the other.

D, That part, where after they have pass the right Ventricle, they are turn'd back, and end obliquely in the Tendon of the left Ventricle.

FIG. IX.

The external Fibres of the left Ventricle, as they arise in a spiral manner from the left side of the Heart, and bending towards the left, are fix'd in the *Basis* of the Heart.

A, The *Basis* of the left Ventricle.

B, The *Cone*, where the fleshy Fibres seem to be turn'd in, or back again.

CC, The Fibres ascending obliquely towards the *Basis*.

D, The side next the right Ventricle.

E, The left side.

FIG. X.

The manner of the Contorsion of the Fibres.

A, The Tendon of the right side.

B, The Tendon of the left.

C, Some Fibres, as they pass on the out-side of the Heart.

D, The Fibres, as they march on the inside of the Ventricle.

E, The Contorsion of both orders of Fibres about the *Cone* of the Heart.

FIG. XI.

AAAA, The external Fibres, meeting in the *Cone*, in a spiral manner, as at an *Axis*.

T A B. II-

FIG. I. After Caspar Bauhin, the II, III, IV, V, and VIth, after Bartholin; the VIIth. from Dr. Lower. All which Figures are here revers'd.

FIG. I.

Shews the conjunction of the *Vena Cava*, with the Vein of the Lungs, in a *Fœtus*.

A, The Body of the Heart.

B, The descending Trunk of the *Vena Cava*.

C, The ascending Trunk.

DF, The *Arteria Magna*.

E, The *Axillary Artery*.

G, The right Auricle.

H, The *Anastomosis* between the *Vena Cava*, and vein of the Lungs, called the *Foramen Ovale*, which is closed with a Valve, in the Adult.

FIG. II.

Represents the *Canalis Arteriosus*, between the *Arteria Pulmonalis*, and great Artery in a *Fœtus*.

A, The Heart.

B, The Trunk of the *Arteria Magna*.

C, A Portion of the great Artery which passes downwards.

D, The Artery of the Lungs arising from the Heart.

EE, The Arterious Canal between the Artery of the Lungs and *Aorta*.

FFG, The Trunks of the Arteries, which pass to the Head, Arms, &c.

FIG. III.

The right Ventricle of the Heart, opened from the *Vena Cava*, to shew the 3 tricuspid Valves, AAA.

FIG. IV.

The right Ventricle of the Heart, opened from the *Arteria*

Pulmonalis, to shew the 3 semilunary Valves, B,B,B.

FIG. V.

The left Ventricle of the Heart, opened from the *Vena Pulmonalis*, to shew the two Mitral Valves, that at DD, being divided.

FIG. VI.

The same Ventricle opened from the *Arteria Magna*, to shew the 3 semilunary Valves, E,E,E.

FIG. VII.

Demonstrates, why the Blood which comes from the Jugular Veins, does not descend into the *Vena Cava*, but goes into the right Auricle of the Heart.

A, The descending Trunk of the *Vena Cava*.

B, The ascending Trunk.

C, A Tubercle, according to Dr. Lower, which hinders the Blood of the superior Trunk from incommoding of that of the inferior, and directs it into the right Auricle and Ventricle of the Heart.

D, The right Auricle.

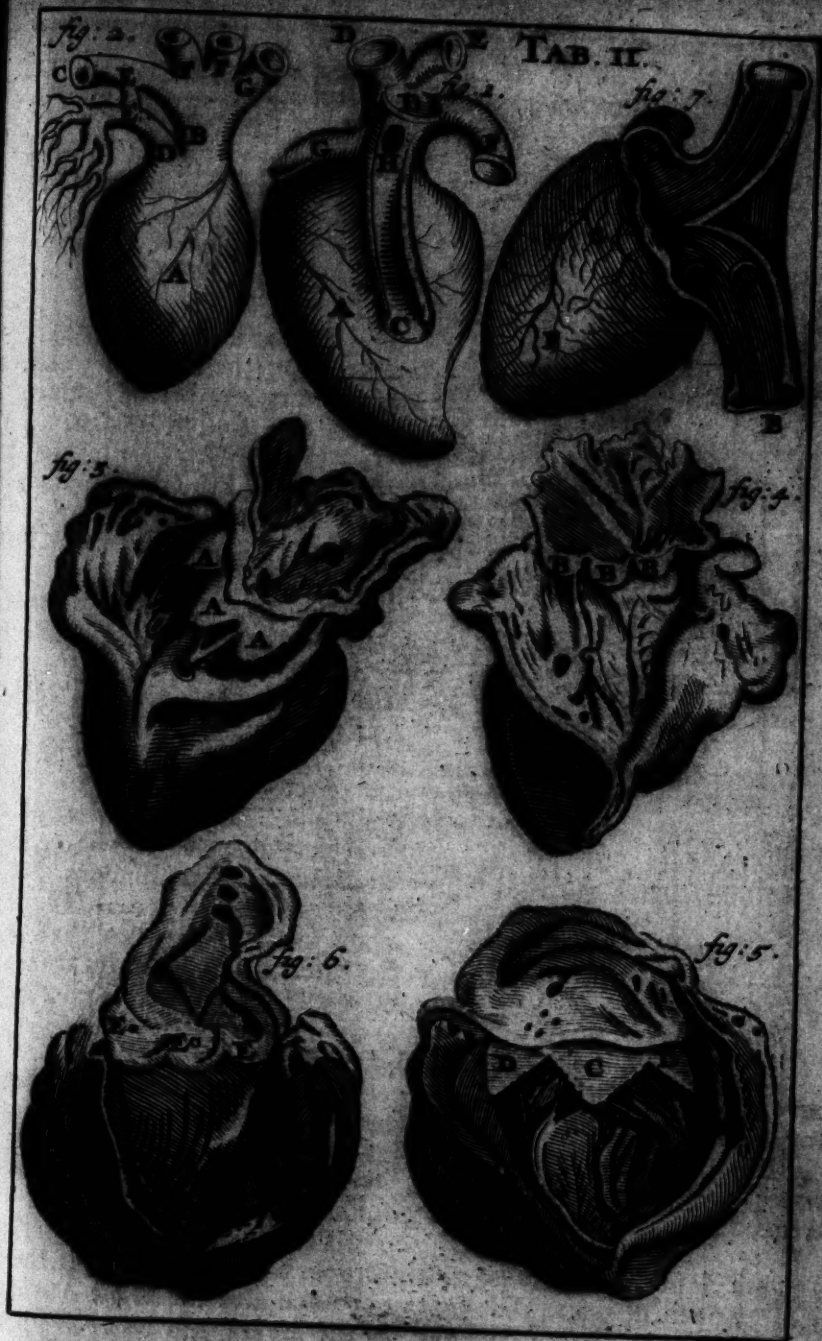
E, The *Foramen Ovale*, between the *Vena Cava* and *Vena Pulmonalis*, clos'd with a Valve.

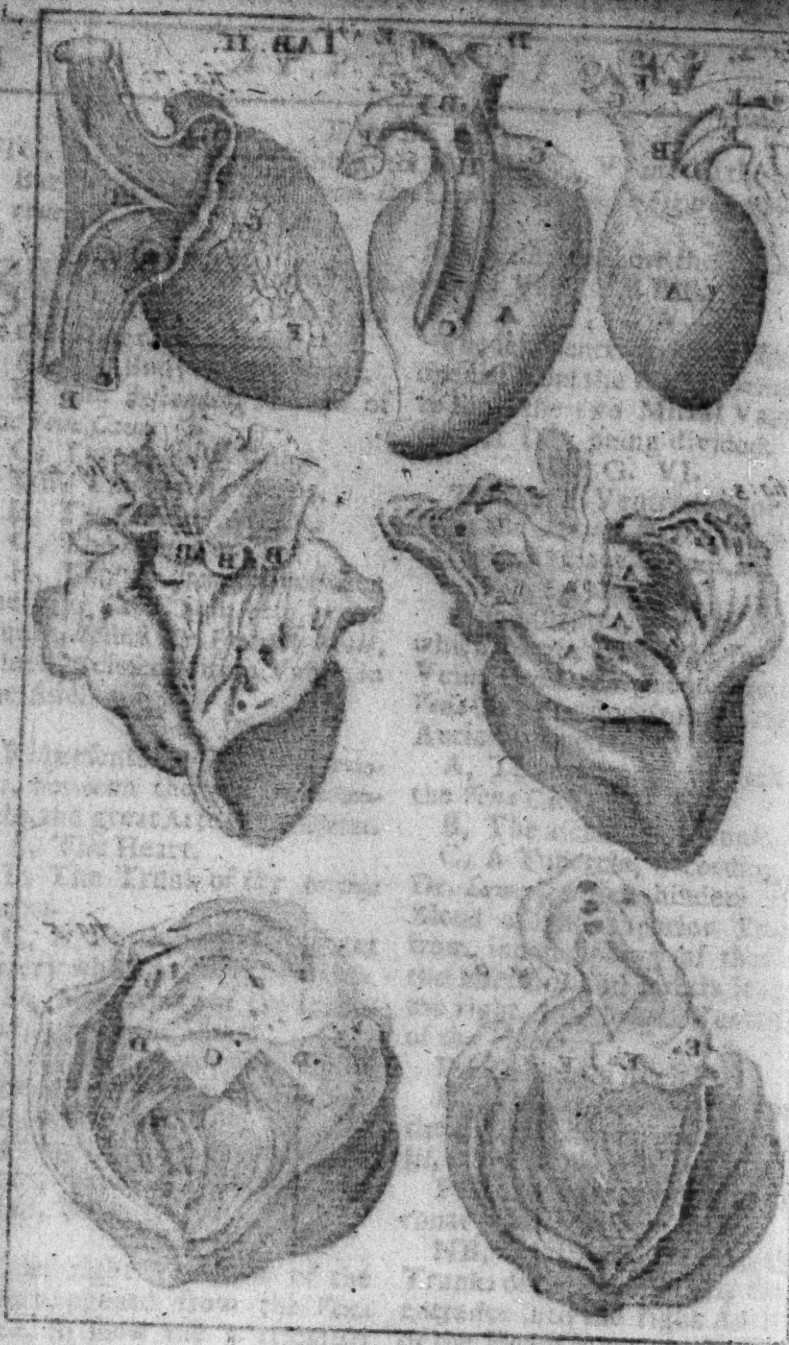
FG, The Heart, with its Coronary Vessels.

NB, This Structure of the Trunks of the *Vena Cava*, at their entrance into the right Auricle of the Heart, is peculiar to some Quadrupeds, and is not found in Humane Bodies; tho' Anatomists, after Dr. Lower, have generally ascribed it to them.

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The right Ventricle of the
Heart, opened from the Artery

in Human Bodies, after the
removal of the Artery, and
the insertion of the Artery

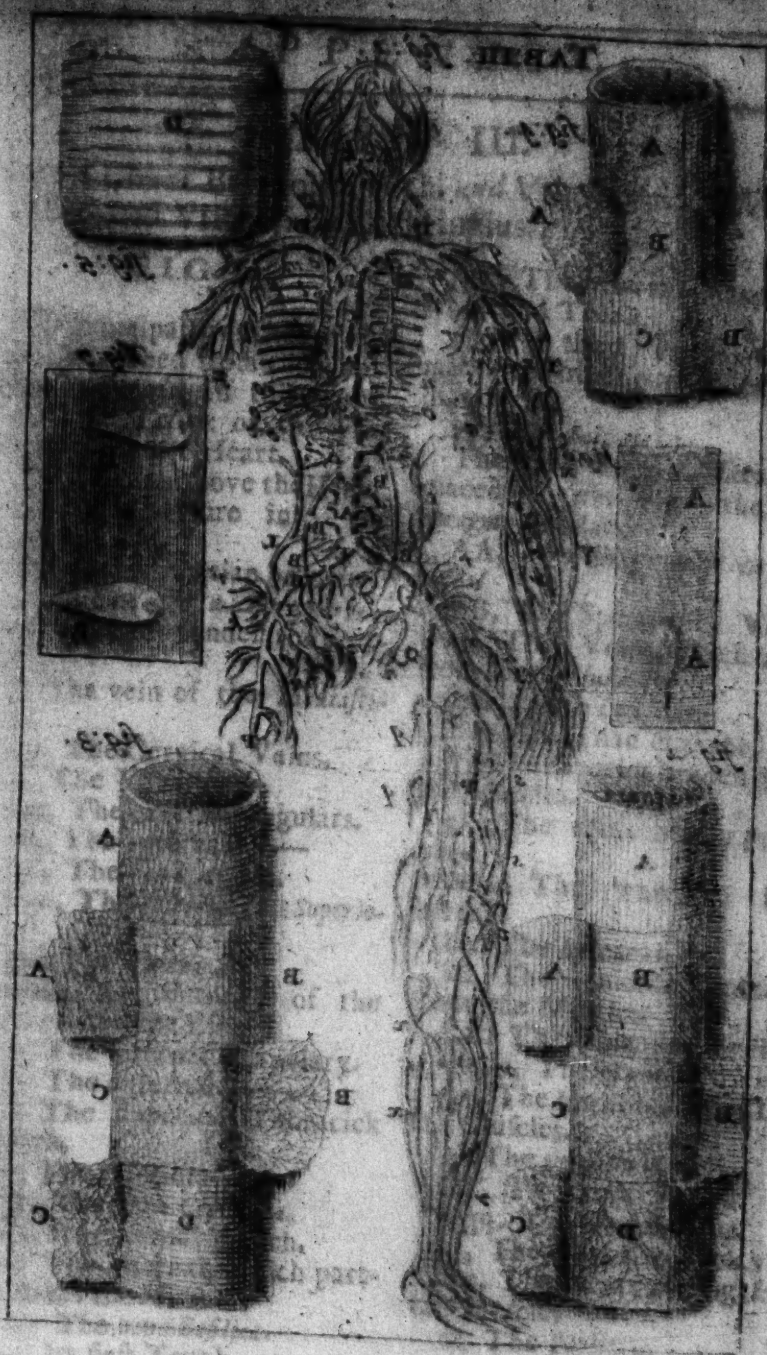
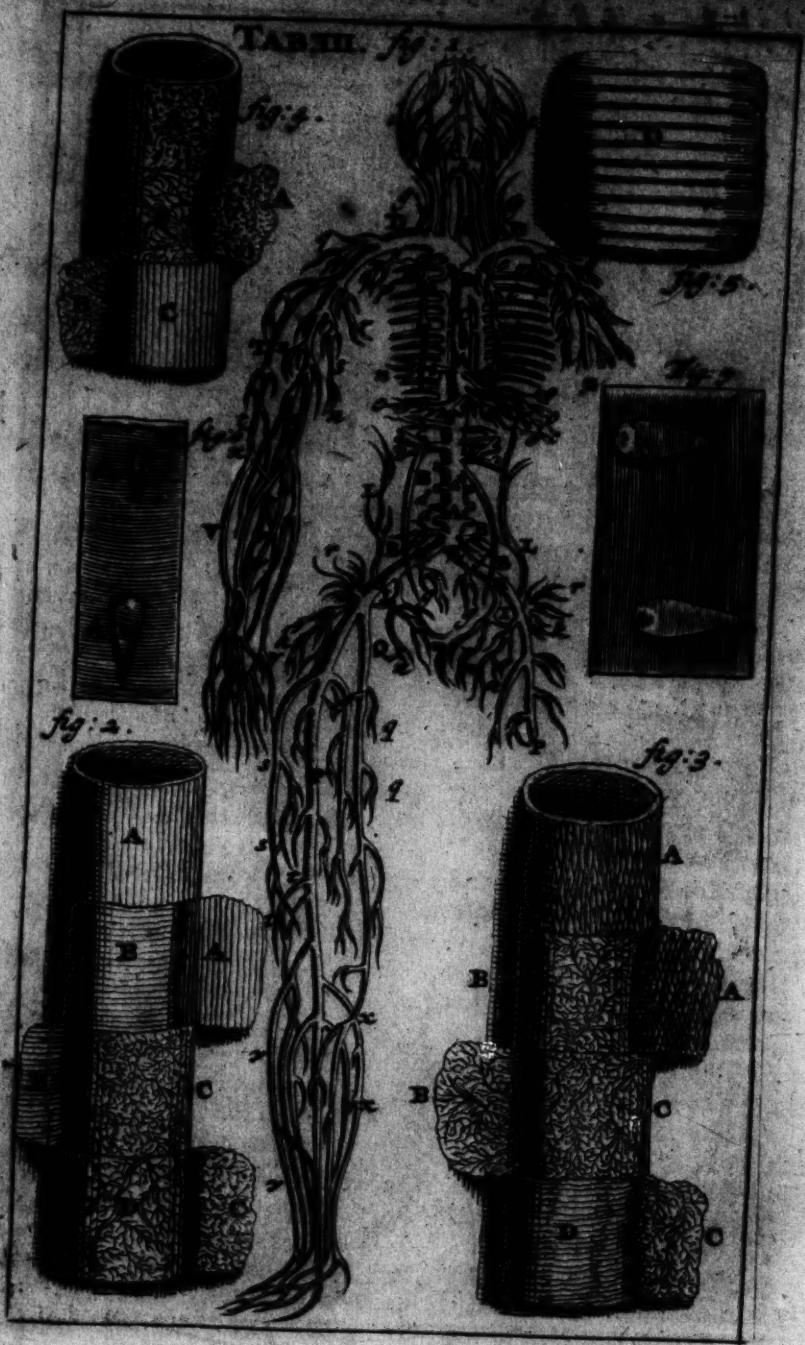


Fig. 1. The human
torso, showing the
external branch of
the trunk.

Fig. 2. The human
torso, showing the
internal branch of
the trunk.



T A B. III.

FIG. I. *From Bartholin, IVth. and Vth. from Dr. Willis, VIth. and VIIth. from Kerkringius.*

FIG. I.

The Principal Branches of the *Vena Cava* freed from the whole Body, revers'd in this Copy.

A, The Trunk of the *Vena Cava*, below the Heart.

B, Its Trunk above the Heart.

C, Its Aperture into the right Auricle.

DD, The Subclavian branches.

ee, The *Vena Mammariæ*, which descend under the Sternum.

f, The vein of the *Mediaſti-num*.

gg, The Cervical Veins.

h, The Vertebralls.

iiii, The external Jugulars.

kk, The internal.—

lll, The *Vena Azygos*.

mm, The *Intercoſtales Superiores*.

nn, The *Pbrenica*.

oooo, The branches of the *vena cava* in the Liver.

p, The internal Scapulary.

q, The external.—

r, The superior Thoracick branch.

s, The inferior.—

T, The *vena Cephalica*,

U, Its external branch.

x, The internal, which partly makes the *Mediana*.

zz, The *vena Baſilica*.

tt, Its first Trunk.

uu, The external branch of its second Trunk,

ww, The internal branch of its second Trunk.

xx, Its third Trunk, which makes the other part of the Median Vein.

yy, The *Salvatella*.

The following Characters are placed on Veins below the *Diaphragme* and *Liver*.

AA, The *Emulgentes* or *Renales*.

BB, The *Spermatick Veins*.

cc, The Veins which arise from the *Capsula Renales*.

dddd, *Vena Lumbares*.

EE, The Iliac branches.

ff, The superior branch from the Muscles.

gg, The veins of the *Os Sacrum*.

HH, The external Iliac branch.

II, The internal.

kk, The middle branches from the Muscles.

LL, The *Epigaſtrick* veins.

mmm, The *Hypogaſtrick*.

nn, The lower branches from the Muscles.

o, The *vena Pudenda*.

PP, The crural Trunk.

Qqq, The *vena Saphana*.

rr, The lesser *Iſchiatick* vein.

Sss, The veins arising from the Muscles.

tt, The *Poplitæ*.

uu, The *Suralis*.

xx, The greater *Iſchiatick* vein.

FIG.

FIG. II.

Part of the Trunk of the great Artery, turn'd inside out.

AA, The internal Nervous Tunick, which perhaps is somewhat musculous, consisting of streight or longitudinal Fibres, which serve to shorten the tube of the Artery.

B, The musculous Tunick, consisting of musculous Fibres, which contracting, drive on the Blood.

cc, The glandulous Tunick, which (like that of the Intestines) is placed under the musculous, and is composed of innumerable small Glands.

D, The external vasculous Tunick, or vesiculous, which is made up with Blood Vessels and Nervous Fibres, variously complicated and contorted like Network.

FIG. III.

The Trunk of a large vein dissected.

AA, The external Tunick (which is somewhat muscular) consisting of Nervous Fibres, that are extended according to its length, altho' their Series is not regular.

BC, The vasculous and glandulous Tunick, like that of the Artery.

D, The internal muscular

Tunick, composed of circular Fibres, like that of the Artery, which, by their contraction, serve to hasten the return of the Blood to the Heart.

FIG. IV. and V.

Shew the Membranes of the Wind-pipe, separated from each other.

D, The external Membrane which is partly Cartilaginous, and partly Muscular; the transverse or annular Fibres of which, are placed in the *Interstisia* of the Cartilages, and tie them together.

AA, The Glandulous Membrane, and BB, the vasculous, which is thought, by some, not to differ from that of the Blood-Vessels, and Intestines.

C, The internal Tunick, with streight muscular Fibres.

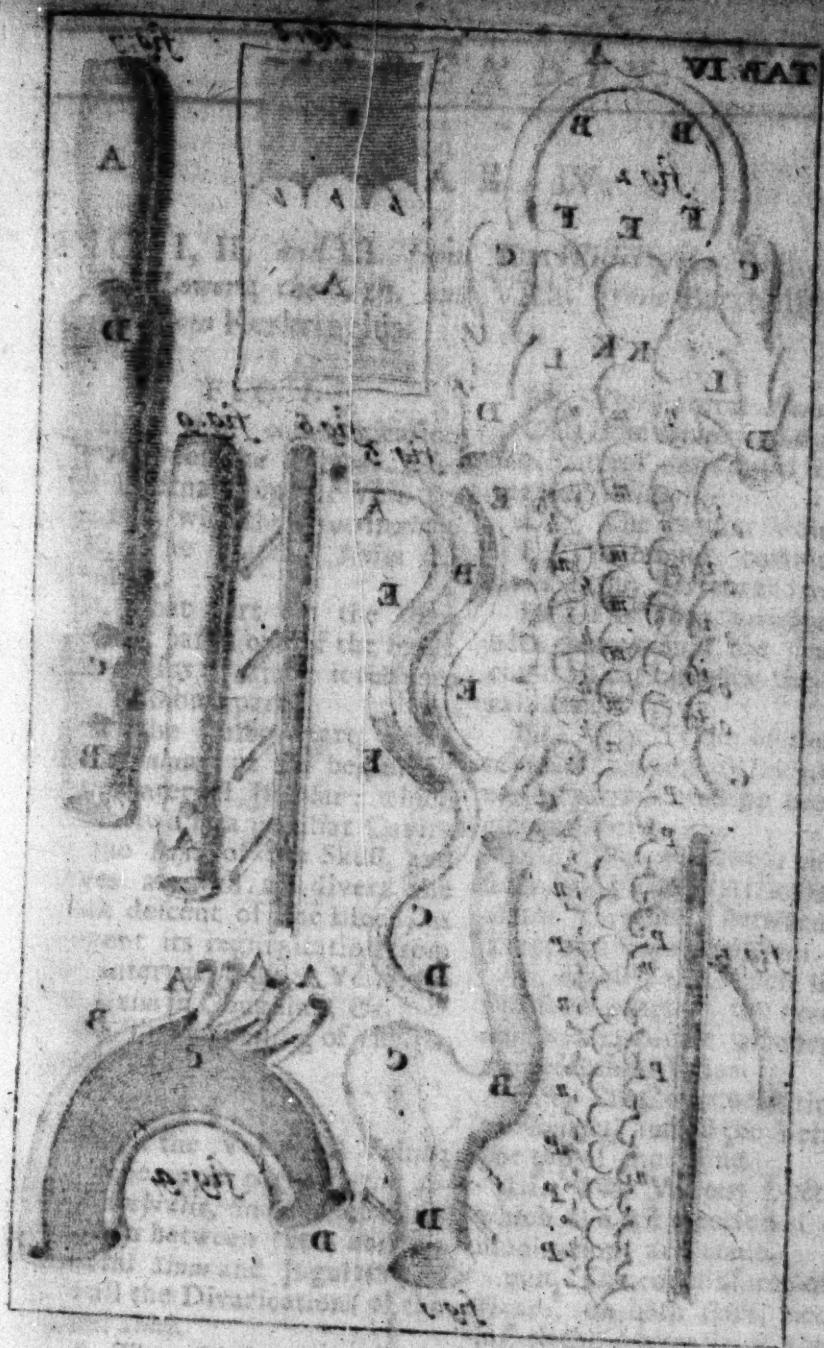
FIG. VI. and VII.

Part of the *vena cava*, open'd to shew the Pyriformal Valves (AA) placed at the Orifices of the veins, at their entrance into the *cava*.

FIG. VII.

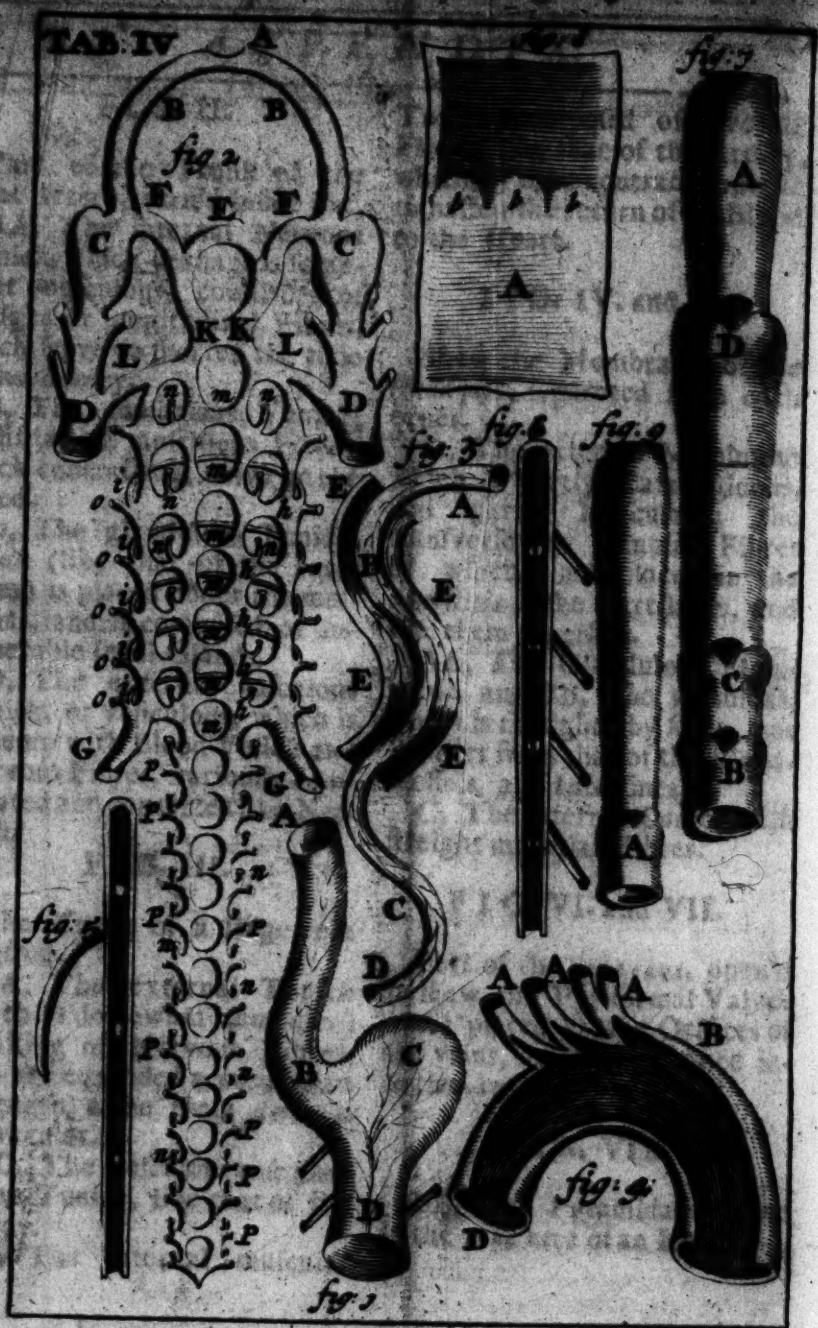
BB, The Pyramidal Valves in the *vena cava* of an Horse.

TAB.



The first part of the
 called the *legamentum*
 where it passes into the
 and the *Diverticulum*

The second part of the
 called the *legamentum*
 where it passes into the
 and the *Diverticulum*



T A B. IV.

FIG. I, II, and III. from Dr. Willis; the IVth. from Dr. Lower; the Vth. and VIth. from Bartholin; the rest from Kerkringius.

FIG. I.

SHews the communication between the Lateral Sinus, and internal Jugular Vein on one side, with the Diverticulum.

A, The Lateral Sinus descending.

B, That part of the Sinus where it passes out of the Skull, and begins to dilate it self into the Bulbous part.

C, The Bulbos part, call'd Diverticulum, at the beginning of the internal Jugular; which is receiv'd in a peculiar Cavity on the Basis of the Skull, and serves as well to divert the quick descent of the Blood, as prevent its regurgitation from the internal Jugular Vein into the Sinus in Coughing, &c.

D, The beginning of the Jugular Vein.

FIG. II.

Shews the Vertebral Veins; with the upper part of the Sinus Vertebralis, and the communication between them and the Lateral Sinus and Jugulars; as also all the Divarications of the spinal Sinus.

A, The third Sinus of the Head, called Longitudinalis cut off, where it passes into the Lateral Sinus.

BB, The Lateral Sinus.

CC, The Diverticulum, where the Lateral Sinus's end in the Jugular Veins.

DD, The Jugular Veins.

E, The upper communications of the vertebral Sinus.

FF, The Sinus vertebralis on both sides within the Cranium, communicating with the Lateral Sinus.

GG, The Trunk of the vertebral Veins on both sides, which empty themselves into the Subclavian Veins.

hhh, The Anastomosis on both sides, lying on the Articulations of the Vertebra, between the Vertebral Vein and Sinus.

iii, Small Veins which lie on the fore parts of the Vertebra, and communicate between the two vertebral Veins.

KK, The Communications of the Sinuses, and all the Veins on the top of the Spine.

LL, Two Venous Ducts, by which the last mentioned communications are made.

mm, The commissures of the Sinus's, on both sides, according to the Internodia of the vertebra.

nn, The venous Ducts, which carry the Blood from the spinal Marrow into the Sinus.

ooo, The

ooo, The Veins which bring Blood into the vertebals from the Muscles of the Neck, cut short.

pp, Other Venous Ducts likewise, which are continued with the *Vena Azygòs*, and lumbal branches of the *vena cava*, by which, if Wax or Wind is injected into the Trunk of the *vena cava*, below the Diaphragme, either will pass (as it were) back again into the *vena Azygos* and lateral *Sinus's*, within the Skull.

FIG. III.

Shews the Trunk of the Carotid Artery, before it enters the Surface of the Brain, NB. The Contortions of this Artery differ very much in a Humane Body, from what is represented in this Figure; which appears to be done from the Carotid Artery of some Quadruped.

A, The Trunk of the Artery, ascending towards the *Cranium*.

B, The same, whilst it is inclosed within the Bone, and covered with its borrowed Coats.

BC, The bending of the Artery, within the *Sinus* of the Skull, representing a double turn'd S.

D, The Trunk of it passing towards the Brain.

EEE, The Membrane inclosing the Artery in the *Sinus* of the Skull.

FIG. IV.

This Figure is here revers'd.
AAA, The ascending Trunks

of the Arteries which pass to the Head and Arms.

B, The Bending Trunk of the *Aorta*.

C, The Orifices of the ascending Trunks of the Arteries, looking towards the Heart, the better to receive the Blood impell'd from thence, before it passes into descending Trunks.

D, The descending Canal of the *Aorta*.

FIG. V.

The single valves that appear looking upwards, in the *Basilick* vein.

FIG. VI.

Shews the double valves, which appear in the Crural vein, when open'd.

FIG. VII.

Shews the valves of the Jugular veins.

A, The Humane Jugular vein.

B, A three fold valve, where it joins with the Subclavian vein.

C, Another three-fold valve, near the former.

D, A third three-fold valve, three Fingers distance from the second.

FIG. VIII.

A, The Jugular vein opened to shew the three valves.

bbb, The three valves.

FIG. IX.

A, The three valves in the Jugular vein of a Boy.

T A B.

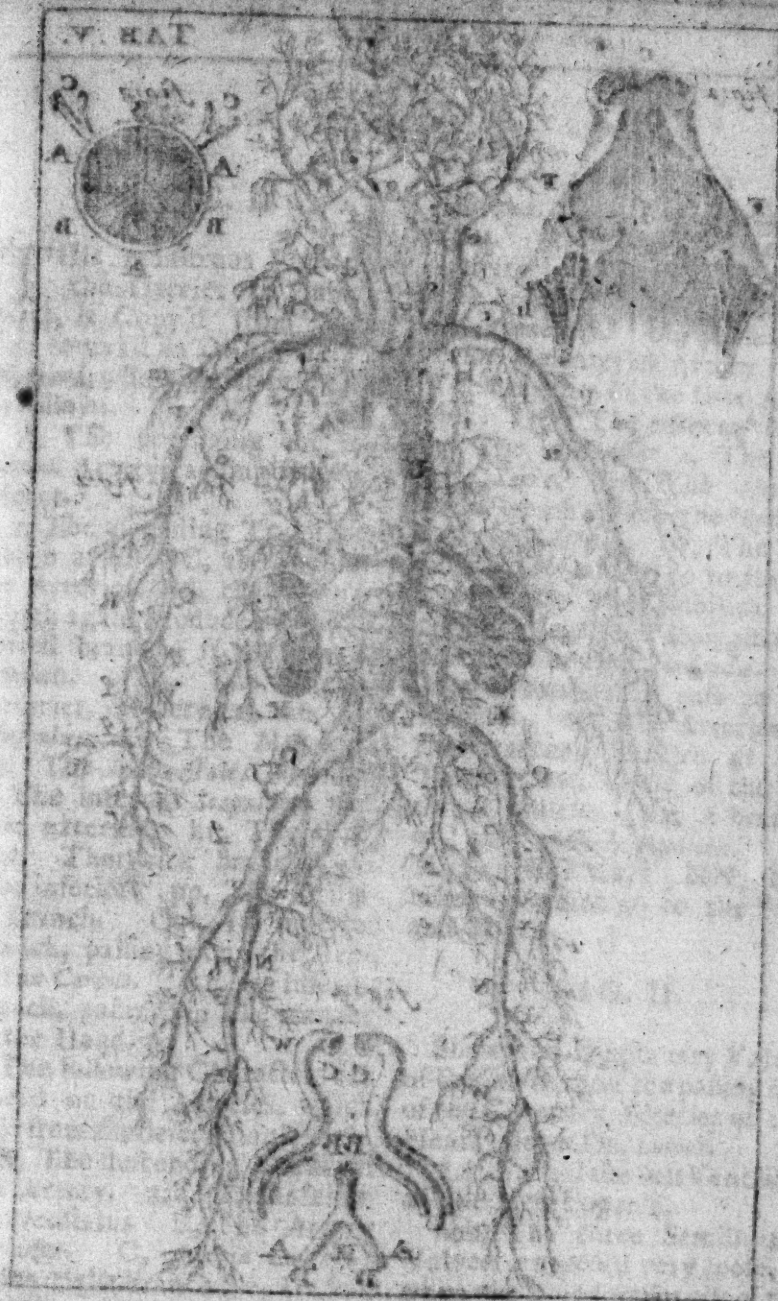
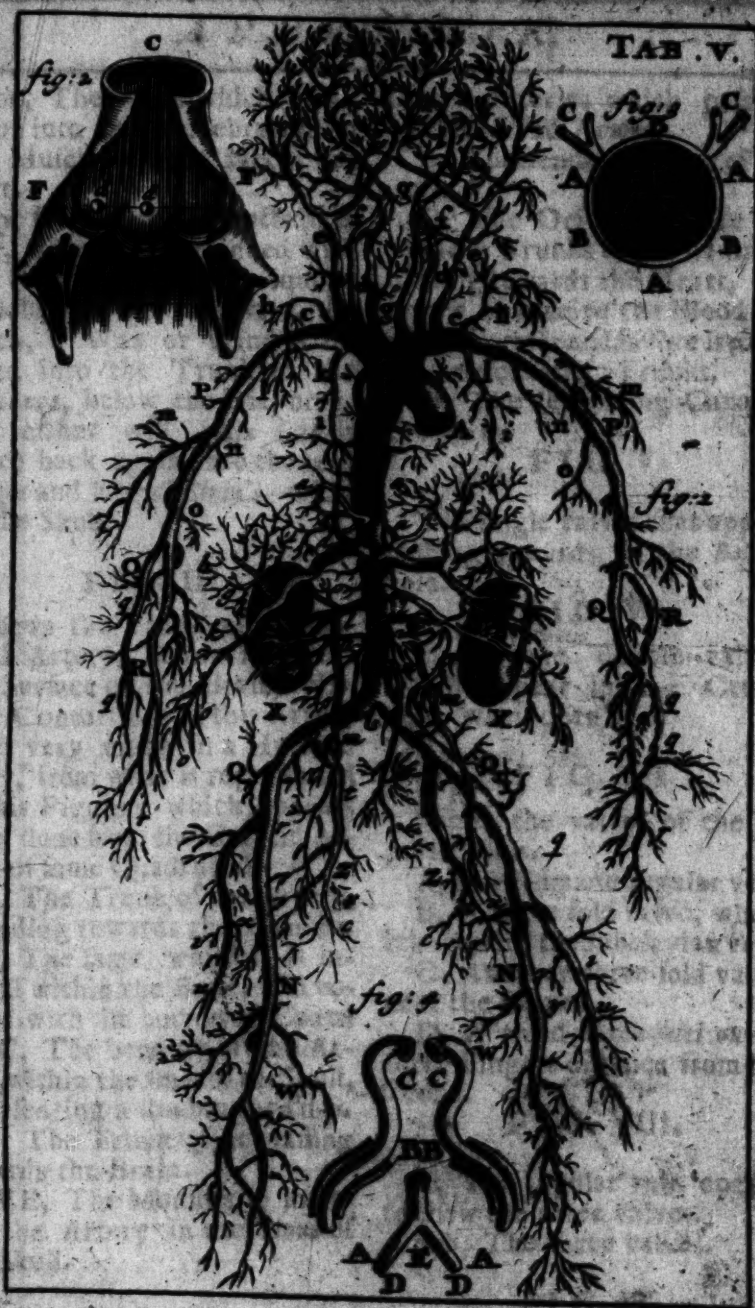


Fig. 1. The human nervous system. A, The brain; B, The spinal cord; C, The trunk of the spinal cord; D, The nerves of the arms; E, The nerves of the legs; F, The nerves of the feet; G, The nerves of the hands; H, The nerves of the fingers; I, The nerves of the toes; K, The nerves of the eyelids; L, The nerves of the nose; M, The nerves of the mouth; N, The nerves of the throat; O, The nerves of the larynx; P, The nerves of the trachea; Q, The nerves of the bronchi; R, The nerves of the lungs; S, The nerves of the heart; T, The nerves of the stomach; U, The nerves of the intestines; V, The nerves of the bladder; W, The nerves of the rectum; X, The nerves of the anus; Y, The nerves of the testis; Z, The nerves of the ovary.



The Pacific is here referred to. A. The water is in the
 A. A. A. The ascending Trench. The water is in the

TAB V.

FIG. I.

THis monstrous Figure of the Arteries of a Humane Fetus, is Copy'd from Bidloo, but revers'd in this Print by Blancard, whose Description take as follows.

A, The beginning of the Great Artery, arising from the Heart.

a, The ascending Trunk, from which arises CC, the Subclavian Arteries, dd, the Carotides, which again produce ee, the external branch; ff the internal branch. gg, The vertebral Arteries, or Cervical. hh, The Muscula. ii, The Mammaria. kk, The Intercostales superiores. ll, The internal Scapulary. mm, The external. nn, The superior Thoracick branch. oo, The inferior. pp, The Axillary branch. Qqq, Its superior branch, passing along the Arm, to the Carpus. Rr, Its inferior branch, passing in like manner to the Hand.

The following Characters are placed on the Arteries, which arise from the descending Trunk.

B, The descending Trunk of the Artery. aaa, The inferior Intercostal. b, The Artery Phrenica. C, Arteria Celiacæ; d, Its right branch; e, Its left branch or Arteria Splenica dispersed with small branches thro' the Spleen. f, The right Gastrick Artery. g, The Gastro-

Epiploica. h, The Arteria Epiploica. kk, The Arteria Mesenterica superior. ll, The Arteria Renales. mm, Testicularēs. nn, Lumbares. oo, The inferior Mesenterick Artery. pp, The branches of the Iliac Arteries. QQ, The external Iliac. rr, The internal. s, The Arteria Sacra. tt, The Hypogastrick, which pass to the Rectum, and the Pudenda. vv, The Hypogastricks which go to the Uterus. xx, The Umbilical Arteries. zz, The Epigastricæ. cc, The Arteria Pudenda. ii, The Arteries that pass to the Muscles. un, The Arteries of the external Muscles of the Thigh. ww, Those of the internal Muscles. xx, A branch of the Arteria Poplitea. yy, Those of the Calf. NN, The branches which go to the Feet and Toes.

FIG. II.

Shews the Semilunary Valves of the Aorta, and the passing out of the Coronary Arteries of the Heart; from Dr. Lower.

AA, Part of the left Ventricle of the Heart open'd.

bbb, The three Semilunary Valves, express'd very loose, as when the Blood passes out of the Heart.

C, The Trunk of the Aorta open'd.

dd, The Orifices of the two Coronary Arteries.

Coronary Arteries, immediately without the Valves.

ee, The root of the *Aorta*, where it is united with the Tendon of the Heart.

FF, The Mitral Membranes divided, and brought forwards on each side.

FIG. III.

Shews the Semilunary Valves, as they appear when they hinder the return of the Blood from the *Aorta*; by Dr. Lower.

AA, The *Aorta* cut off next the *Basis* of the Heart.

BBB, The three Semilunary Valves, mutually touching each other.

CC, The two Coronary Arteries.

FIG. IV.

Shews the manner how the Carotid and Vertebral Arteries, ascend into the Skull, from Dr. Lower.

AA, The two Carotid Arteries, where they enter the Bone of the Skull.

BB, That part of them, which is inclosed in the Body of the Bone.

CC, Those parts which pass by the sides of the *Sella Turcica* before they reach the Brain.

DD, The Vertebral Arteries where they pass into the Skull.

EE, Their Union into one Trunk, which is again divided and joined by small branches with the Carotids.

T A B VI.

Both from Kerkringius, but revers'd in these Prints.

FIG. I.

THE Ramifications of the *Vena Porta*, within the Liver.

A, The place where the *Vena Porta* enters the Liver, shewing its *Foramen*, when cut from its other part.

BB & c, The five principal great branches of the *Porta*, within the Liver.

C, The Umbilical Vein turn'd into a Ligament.

D, The *Canalis Venosus*, be-

tween the *Vena Porta* and *Cava*, also turn'd into a Ligament.

EEE, The Extremities of the Capillary Veins.

FIG. II.

The Ramifications of the *Vena Cava* within the Liver.

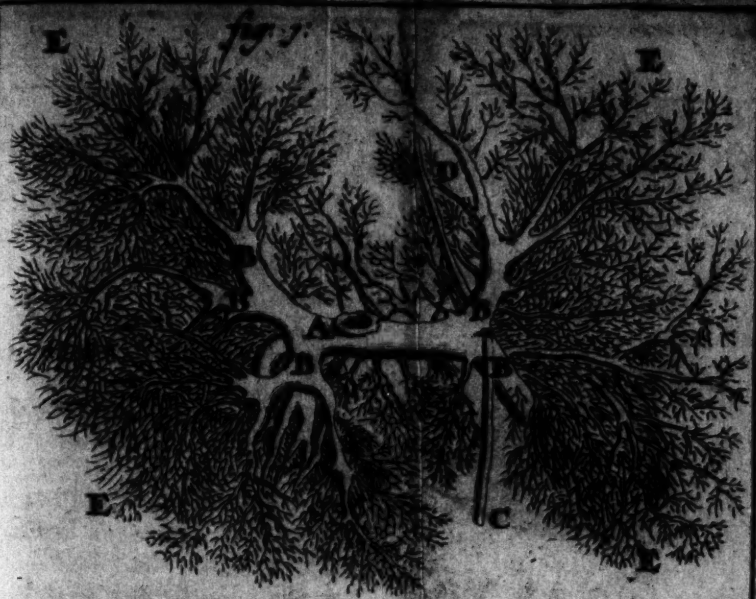
A, The Trunk of the *Vena Cava*.

B, Part of the Diaphragm.

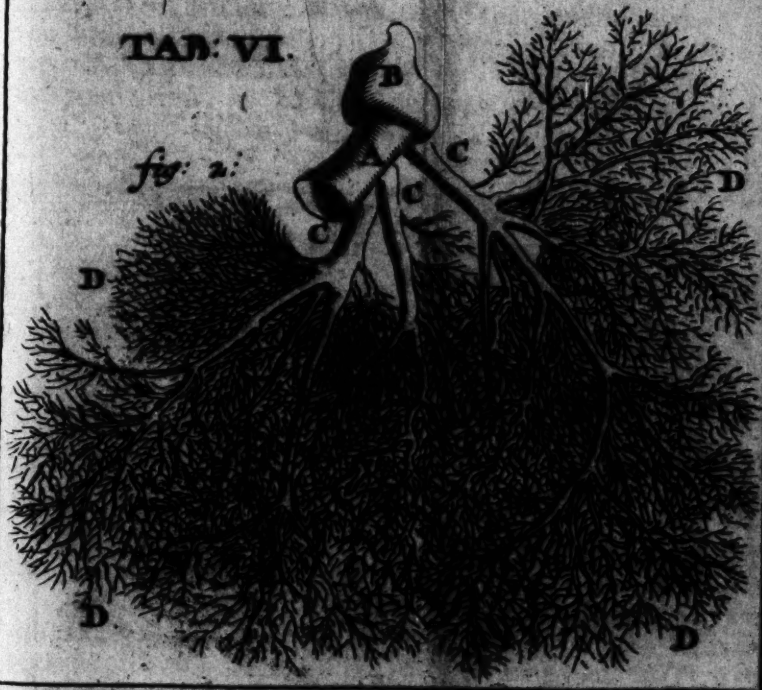
CCC, The three chief branches, which are again divided into others.

DDD, The extremities of the Capillary veins.

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TAB. VI.



Coronary
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AA The Artery cut off near the base of the Heart.

BB The Artery Semilunar Valve, which is of an oblique shape.

CC The Artery of the Arteries, which is of an oblique shape.

DD The Artery of the Arteries, which is of an oblique shape.

EE The Artery of the Arteries, which is of an oblique shape.

FF The Artery of the Arteries, which is of an oblique shape.

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BB The Vertebral Arteries, which pass into the Skull.

CC The Artery of the Arteries, which is of an oblique shape.

DD The Artery of the Arteries, which is of an oblique shape.

EE The Artery of the Arteries, which is of an oblique shape.

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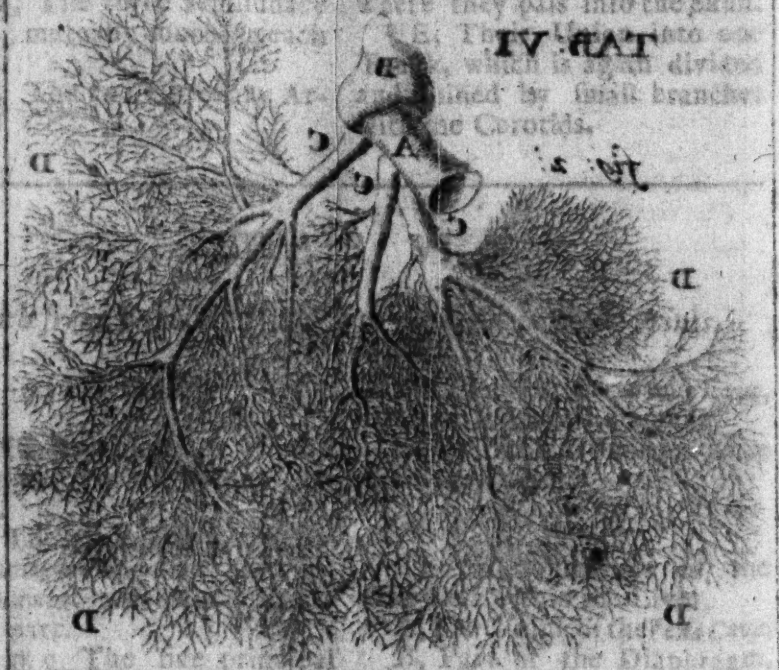
QQ The Artery of the Arteries, which is of an oblique shape.

RR The Artery of the Arteries, which is of an oblique shape.

SS The Artery of the Arteries, which is of an oblique shape.

TT The Artery of the Arteries, which is of an oblique shape.

UU The Artery of the Arteries, which is of an oblique shape.



TAB. VI

Fig. 1

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CC The Artery of the Arteries, which is of an oblique shape.

DD The Artery of the Arteries, which is of an oblique shape.

EE The Artery of the Arteries, which is of an oblique shape.

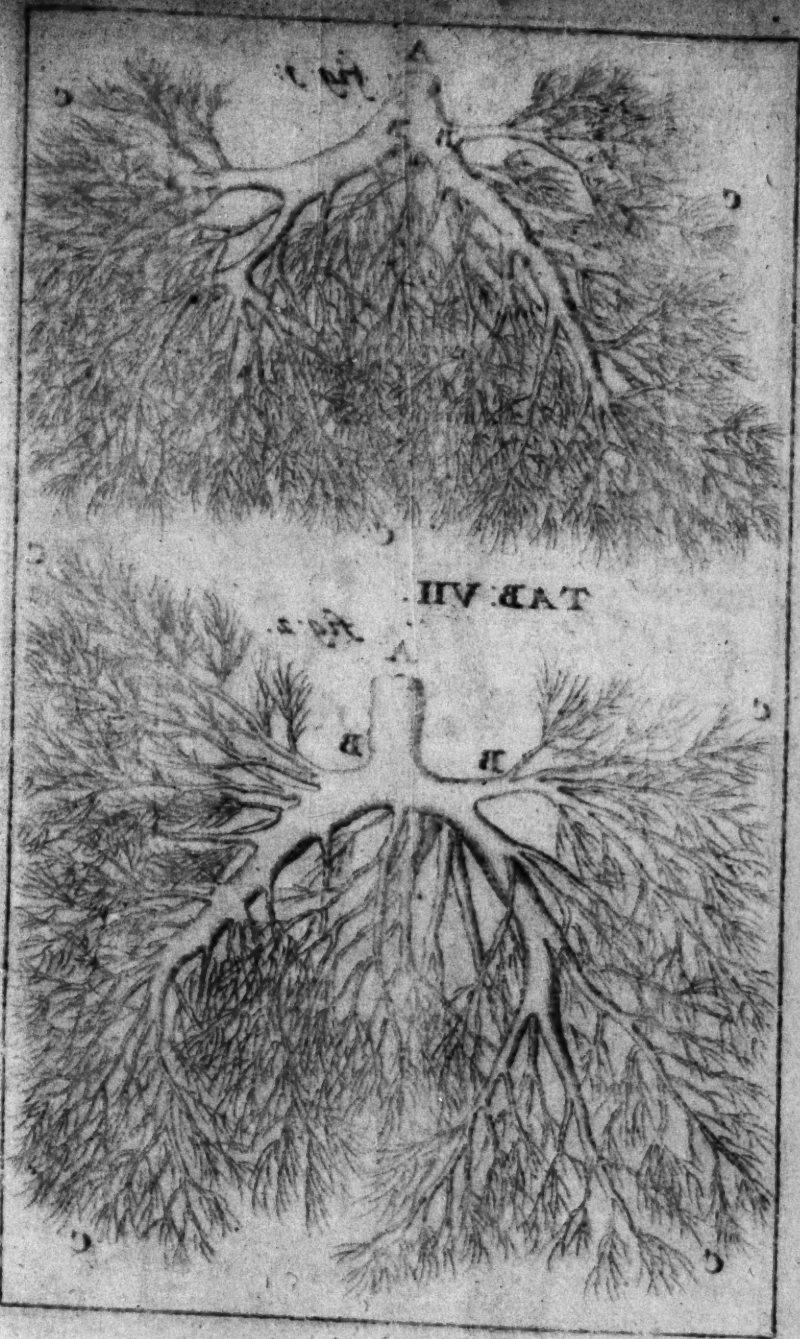
FF The Artery of the Arteries, which is of an oblique shape.

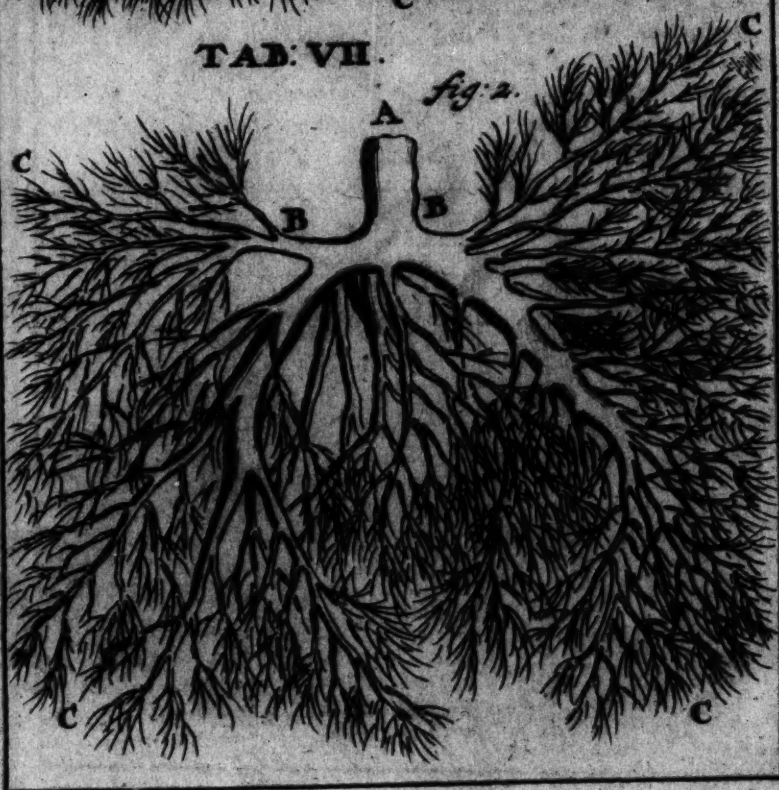
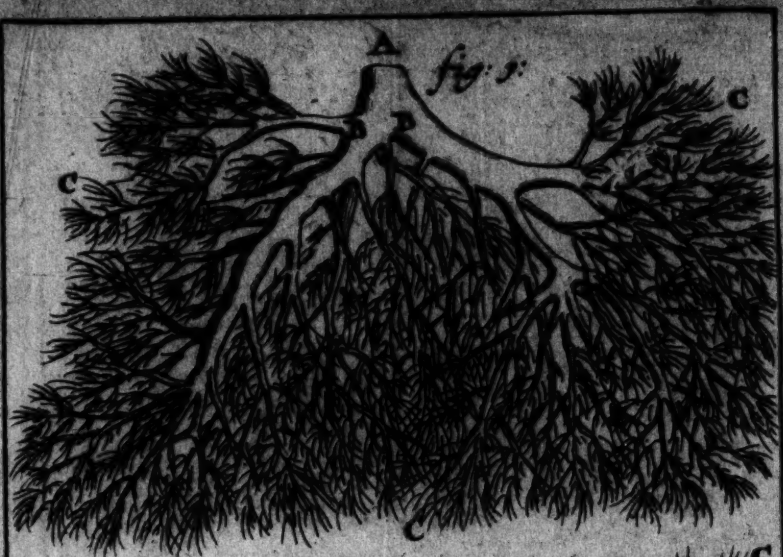
GG The Artery of the Arteries, which is of an oblique shape.

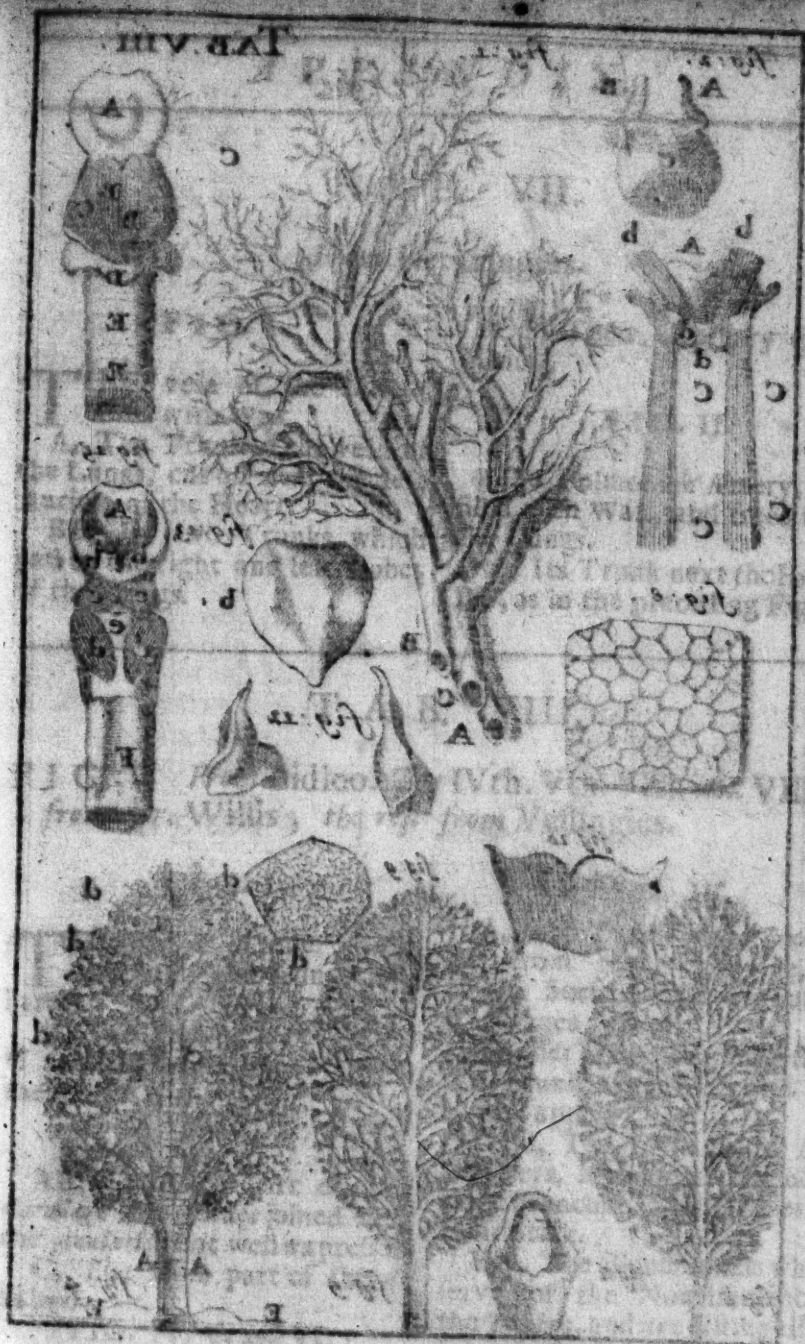
HH The Artery of the Arteries, which is of an oblique shape.

II The Artery of the Arteries, which is of an oblique shape.

JJ The Artery of the Arteries, which is of an oblique shape.







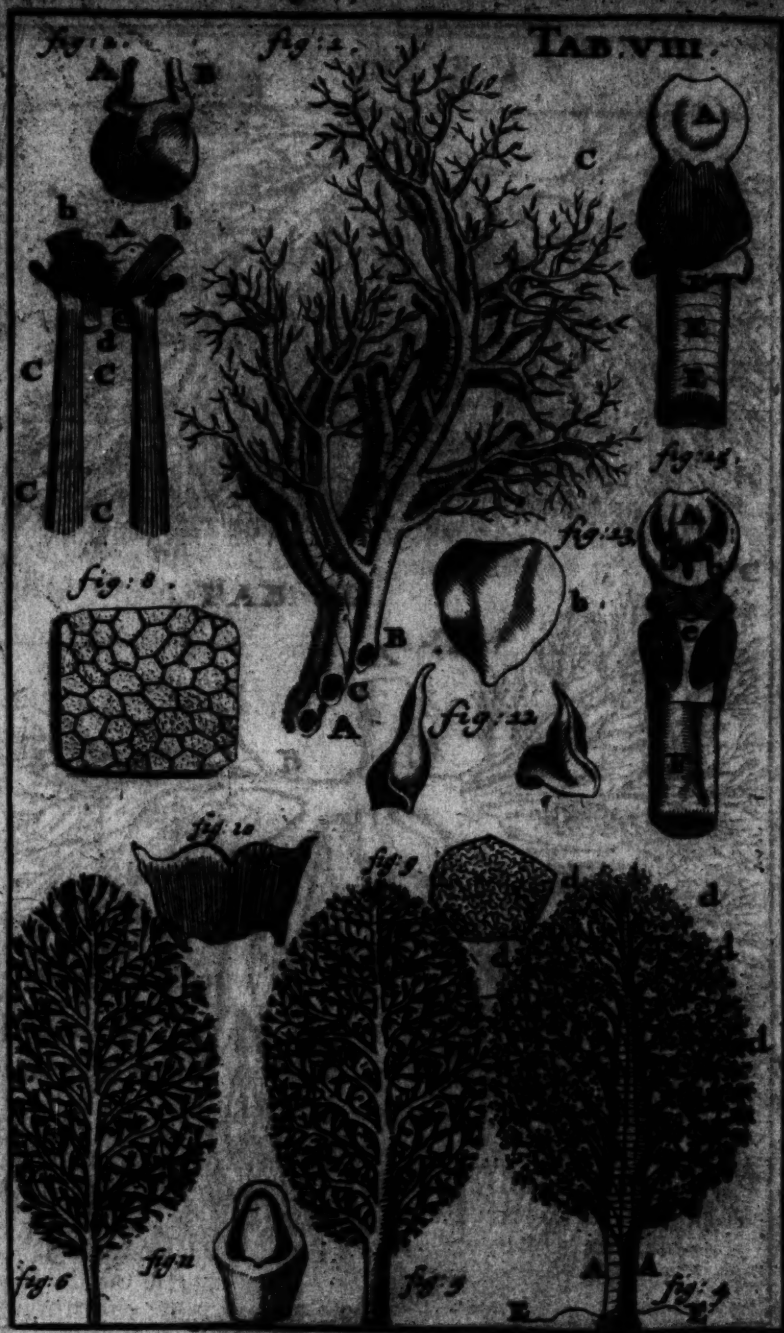
Shows the blood vessels and
 branches of one of the small lobes
 of the Lungs, separated from
 each other.

FIG. the V.B. The Pulmo-
 nary vein. FIG. VI. The Ar-
 tery of the Lungs, which ac-
 companies the Vein, in one
 part, FIG. I.

h s

FIG.

TAB. VIII.



T A B. VII.

From Kerkringius.

FIG. I.

THE vein of the Lungs, fill'd with Wax.

A, The Trunk of the vein of the Lungs, cut off near the left Auricle of the Heart.

BB, Its two Trunks which pass to the right and left Lobes of the Lungs.

CC, Their Capillary extremities.

FIG. II.

The Pulmonick Artery, also fill'd with Wax, and freed from the Lungs.

A, Its Trunk next the Heart, BC, as in the preceding Figure.

T A B. VIII.

FIG. I. From Bidloo, The IVth. Vth. VIth and VIIIth. from Dr. Willis; the rest from Vesslingius.

FIG. I.

THE vessels of one of the Lobes of the Lungs laid bare.

A, The Artery, B the vein, C the Trachea, lying between them.

FIG. II.

AB, The back part of the Cartilago Arytanoides joined with the Anularis, not well express'd.

C, The back part of the Anularis.

FIG. IV. V. and VI.

Shews the Blood vessels and Bronchus of one of the small Lobes of the Lungs, separated from each other.

FIG. IV.

A, The Trunk of the Trachea, cut from the Wind-pipe, in whose Surface the Annulary Cartilages appear.

B, Lesser branches arising from the Trunk, in which also the Annuli appear.

C dd, The little round Air-Bladders, hanging at the end of those branches, like Grapes to their Stalk.

EE, The Blood vessels which serve for the Nourishment of the Trachea, and are distinguish'd from those of the Lungs.

FIG. the Vth. The Pneumonick vein. FIG. VI. The Artery of the Lungs, which accompanies the Trachea, as express'd, FIG. I.

FIG. VIII.

Shews part of the outward Membrane, which covers the whole substance of the Lungs, which by means of the multiplicity, and variety of vessels terminating into it, seems in a manner punch'd thro' with innumerable little Holes, and by the windings of the Blood Vessels, whose Capillaries running along its inner Surface, encompass the Globular Vesicles, divided into a multitude of irregular Squares of unequal sides.

FIG. IX.

Shews a Portion of the external Membrane, separated with the broken off-clusters of Vessels, and without the squares, only with the small Cells (which are the divided Air Bladders) and appear against the Light as if prick'd through.

FIG. X.

The external Face of the *Thyroide*, or *Scutiform* Cartilage.

FIG. XI.

Shews the back part and superior Surface of the *Cricoides*, or Ring-like Cartilage.

FIG. XII.

The Arytenoidal Cartilages.

FIG. XIII.

The *Epiglottis*.

FIG. the XIVth. is done for the fore-part of the *Larynx* with its Muscles, all which are so very ill express'd, as well as the same parts (as is pretended) on the back part of the *Larynx*. FIG. XV. and will rather confound than inform the Learner; wherefore we shall pass them by,

FIG. XVI.

The *Thyroide* Cartilage, together with its Muscles.

A, The *Cartilago Scutiformis*, or *Thyroides*.

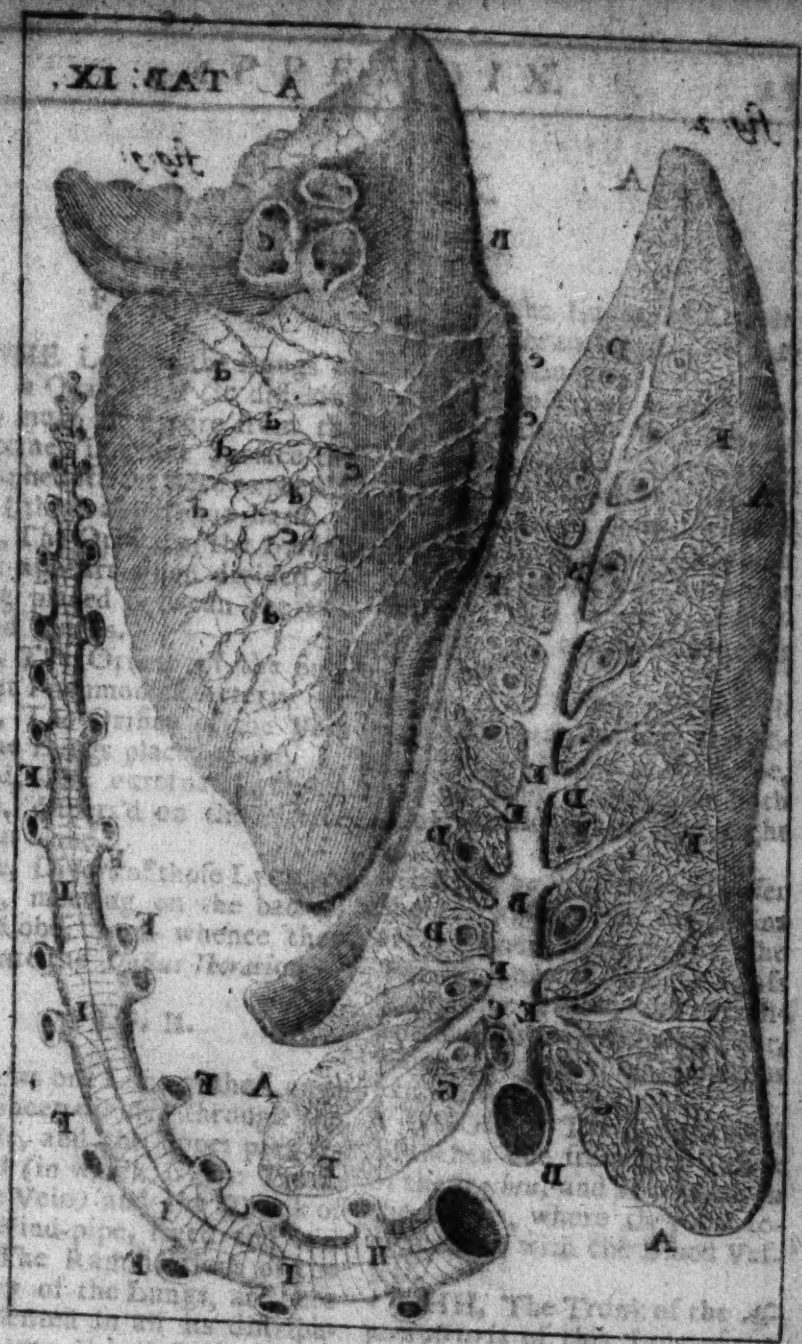
bb, The *Musculi Hyothyroides*.

CC, The *Sterno Hyoides*.

dd, The small Muscles call'd *Cricothyroides*.

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T A B. IX.

From Dr. Willis.

FIG. I.

THE Lobe of the Lungs of a Quadruped (it differing very much in Figure from the Humane) in whose Surface the Lympheducts are here express'd, tho' I think a little too hard.

A, The Orifice of the *Trachea*, as it appears when divided, it being placed between the two Blood Vessels.

B, The Orifice of the Subjacent Pneumonick Artery.

C, The Orifice of the Vein of the Lungs placed above.

ddd, The external Lympheducts, dispers'd on the Surface of this Lobe.

eee, Divers of those Lympheducts, meeting on the back of this Lobe, from whence they pass into the *Ductus Thoracicus*

FIG. II.

Shews one Lobe of the Lungs of a Sheep divided through the middle, and the upper part remov'd (in which is the Trunk of the Vein) and the Trunk of the Wind-pipe, freed and laid by; The Ramifications of the Artery of the Lungs, are here represented in all its distributions into the little, or lesser Lobes, being first fill'd with a Tinctur'd Liquid.

AA, The lower half of the

Lobe of the Lungs divided, in which the branchings of the Artery of the Lungs appear.

BB, The Trunk of the Pneumonick Artery of this Lobe.

C, The Hole after a considerable branch of it is cut off.

DDD, Its Trunks, whence other branches are cut off, which could not be express'd in this Figure; they passing to the upper part of the Lobe which is here cut off.

EE, The Trunk of the Pulmonick Artery, passing according to the length of the Lobe, and emitting branches on both sides, which pass to the right and left.

FFF, The Branches and lesser Shoots, which with the Veins every where accompany the *Bronchi*; and at length pass beyond the *Bronchi*, and encompass the Orbicular Vesicles of Air, which they with their numerous extremities twine about.

GGGG, The Bronchial Branches cut from the Trunk of the *Trachea*, and remaining in the Lungs, where they are accompanied with the Blood Vessels.

HHH, The Trunk of the *Astpera Arteria* of this Lobe of the Lungs, on which the Pulmonick Artery lay, here freed from thence and laid aside.

III, The

III, The *Arteria Bronchialis* of *Ruyfch*.

NB, That FF, &c. plac'd by the *Bronchi* of this last describ'd Figure ought to be fff, according to Dr. *Willis*, shewing the

Trunks of Branches of the *Bronchi*, which are partly those represented cut off at GGG, and partly those that pass to the other part of the Lobe.

T A B. X.

FIG. II. From *Fredrick Ruyfch*, the other from Dr. *Willis*.

FIG. I.

Shews one Lobe of the Lungs, according to the Ramifications of the Wind-pipe, divided into little and lesser Lobes, whose Vessels with their branches were first fill'd with a Liquid, before the lesser Lobes were separated from each other.

A, The Trunk of the *Aspera Arteria* cut off,

EBB, Its lower part open'd to shew the *Foramina* that lead into the several Branches, as well as its streight Fibres.

aaa, The *Foramina* which lead into the branches.

bbb, The streight Fibres, lying on the others, which are Circular.

CC, The upper part of the Trunk of the *Trachea* remaining intire, so that the Annular Cartilages appear.

DDD, The branches of the *Trachea* constituting the lesser Lobes; also intire, so that the Annular Cartilages appear.

EE, Two of the branches slit open, to shew their *Foramina* and streight Fibres.

FF, &c. The Trunks cut off, and their Branches remov'd to make room for the expansion of those that remain.

GGG, The Secondary little Lobes of the *Bronchi*, hanging by stalks, like *Grapes*, which may still be divided into lesser *Lobuli*; all which have Ducts from the *Bronchi*, that pass into their Vesicular Cells.

H, The Blood Vessels creeping on the Superficies of the *Lobuli*.

FIG. II.

The back-part of the Wind-pipe, with its branches, freed from the Lungs of a *Calf*.

A, The *Aspera Arteria*, cut off below the *Larynx*.

B, Its branches of the right side of the Lungs.

c, Those of the left.—

D, The *Bronchial Artery*, whose Branches accompany those of the Wind-pipe to their extremities.

E, The hinder-part of the descending Trunk of the great Artery, where the *Intercoastal Arteries* arise from it.

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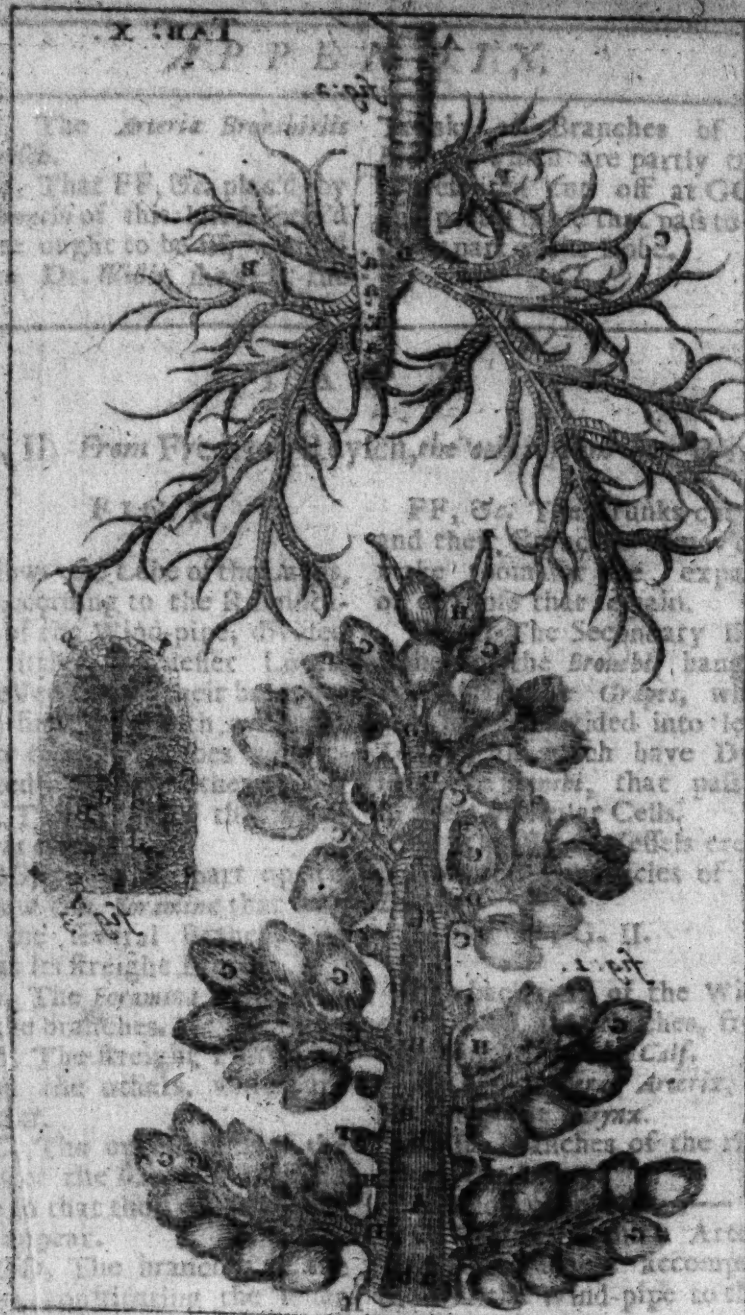


FIG. 11 From FIG. 10, in plan view.

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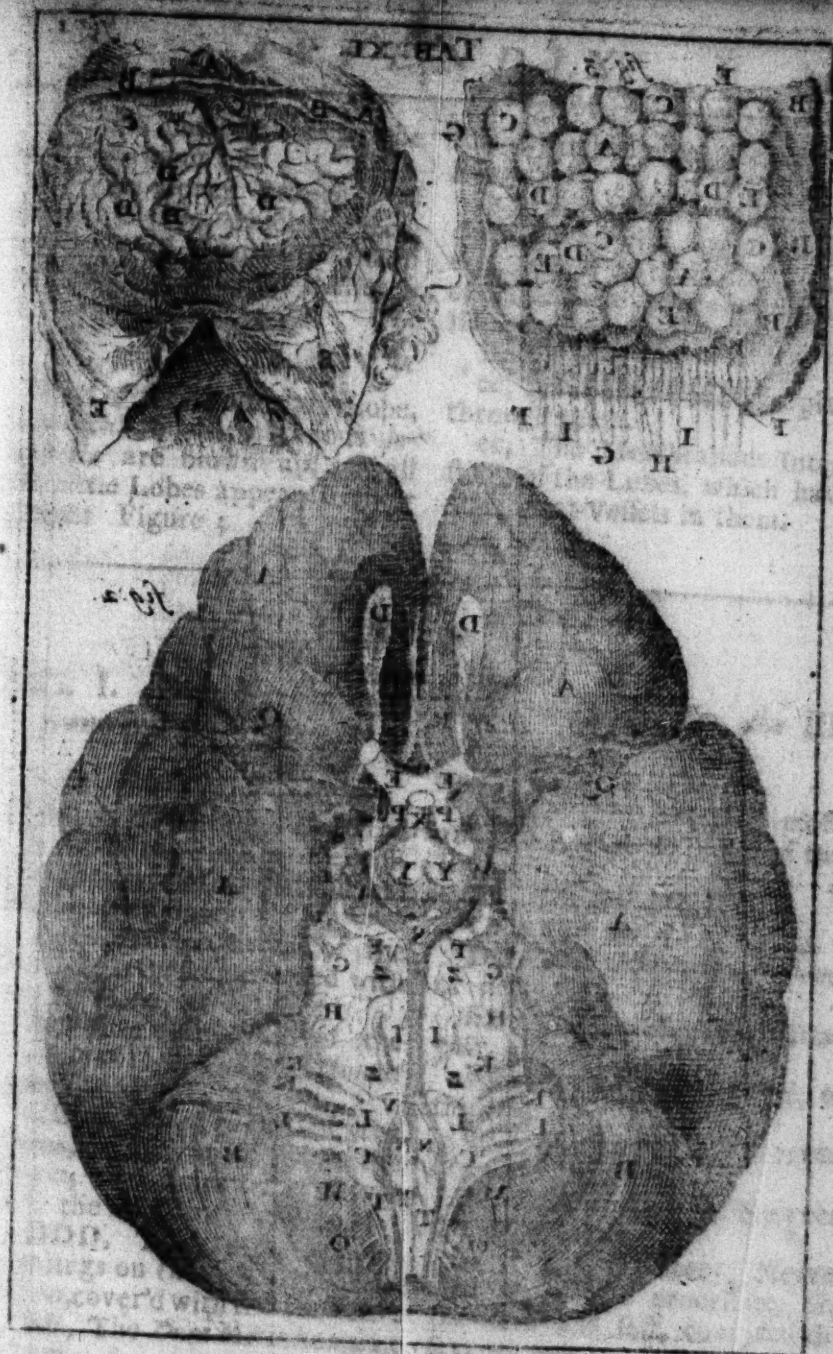


FIG. II.
Brain lying on its back,
to show its base.



aa, The small Trunks of the Intercostrals cut off.

F, The upper Branches of the Wind-pipe, which is peculiar to some Quadrupeds, and not found in Humane Bodies.

FIG. III.

Part of the Pulmonary Lobe, in which, the Membranous *Interstitia* are blown up, and all the little Lobes appear in their proper Figure; which does

somewhat represent the Leaf of *Polypody*.

A, Part of the Wind-pipe, complicated with other Vessels that come to that stalk, and compose little Lobes that grow like the Leaves of a Tree.

BB, The Lobes.

cc, The Blood-Vessel creeping through them.

ee, The Membranous Interstices of the Lobes, which have also Blood-Vessels in them.

T A B. XI.

FIG. I. From Vesalius, the II. from Dr. Willis, the III. from Bidloo.

FIG. I.

Shews the Brain, after the top of the Skull is taken off, and the *Dura Mater* divided and left hanging down.

AAA, The right side of the Brain, partly seen covered with the *Pia Mater*.

BB, The third *Sinus* of the *Dura Mater*, call'd *Longitudinalis* open'd.

CCC, The Trunks of the Veins, which arise from the Brain, and empty themselves into the last mentioned *Sinus*.

DDD, The turnings and windings on the Surface of the Brain, cover'd with the *Pia Mater*.

EE, The *Dura Mater* hanging down.

FIG. II.

The Brain lying on its Hemispheres, to shew its Basis.

AAAA, The two fore-most, and two hind-most Lobes of the Brain.

BB, The *Cerebellum*.

CC, The *Medulla Oblongata*.

DD, The Olfactory Nerves, or first pair.

EE, The Optick, or second pair.

FF, The *Oculorum Motoriæ*, or third pair.

GG, The Pathetick Nerves, or fourth pair.

HH, The fifth pair of Nerves.

II, The sixth.

KK, The Auditory Nerves with their two processes, viz. the hard and soft, counted the seventh pair.

LL, The eighth pair, call'd *Vagus*, consisting of diverse Fibres.

MM, The Spinal Nerves, call'd *Accessorii*, which pass out of

of the Skull with the *Par Vagum*.

NN, The ninth pair of Nerves composed of divers filaments, which passing down, unite into one Trunk, and marches out a little above the *Proceſſus Occipitalis*.

OO, The tenth pair of Nerves tending downwards.

PP, The Trunks of the Carotid Arteries cut off.

QQ, Their Branches marching between the Lobes of the Brain.

R, The fore-moſt branches of the Carotide Arteries, marching between the Anterior Lobes of the Brain.

S, The hind-moſt branches of the Carotids, joyning to the Vertebral Arteries with One Trunk.

TTT, The three Trunks of the Vertebral Arteries, deſcending towards the *Medulla Oblongata*.

U, Their conjunction into one Trunk.

WW, The Communicant branches, between the *Carotids* and *Vertebals*, from whence ſmall Arteries aſcend to the *Plexus Choroides*.

X, The *Infundibulum*.

YY, The two whitish Glands placed behind the *Infundibulum*.

ZZZ, The *Protuberantia Annularis*, by ſome call'd *Pons Varolij*; which ariſing from the *Cerebellum* admits the *Medulla Oblongata* to paſs under it, as under a Bridge.

FIG. III.

The Cortical Glands of the Brain, together with the Fibres view'd with a *Microſcope*.

AA, Part of the Brain boyled.

BB, The *Dura* and *Pia Mater*, which *Bidloo*, after others, has divided into three Membranes.

CC, The Blood Veſſels, with their Capillary diſtributions and reticular *plexus*, DD.

EE, The various orders of the Cortical Glands.

FF, The Bundles of Tubes, going together, conſtituting the *Medulla*.

GG, The Lobes of the Bundles, or the ſeparations and branches, which are writhed in divers Angles, and turn'd in, and variously diſpos'd.

H, The complicated Tubes produced from theſe.

I, The Nerves, which compoſe the Medullary ſubſtance.

Thus *Blanchard* and *Bidloo*.

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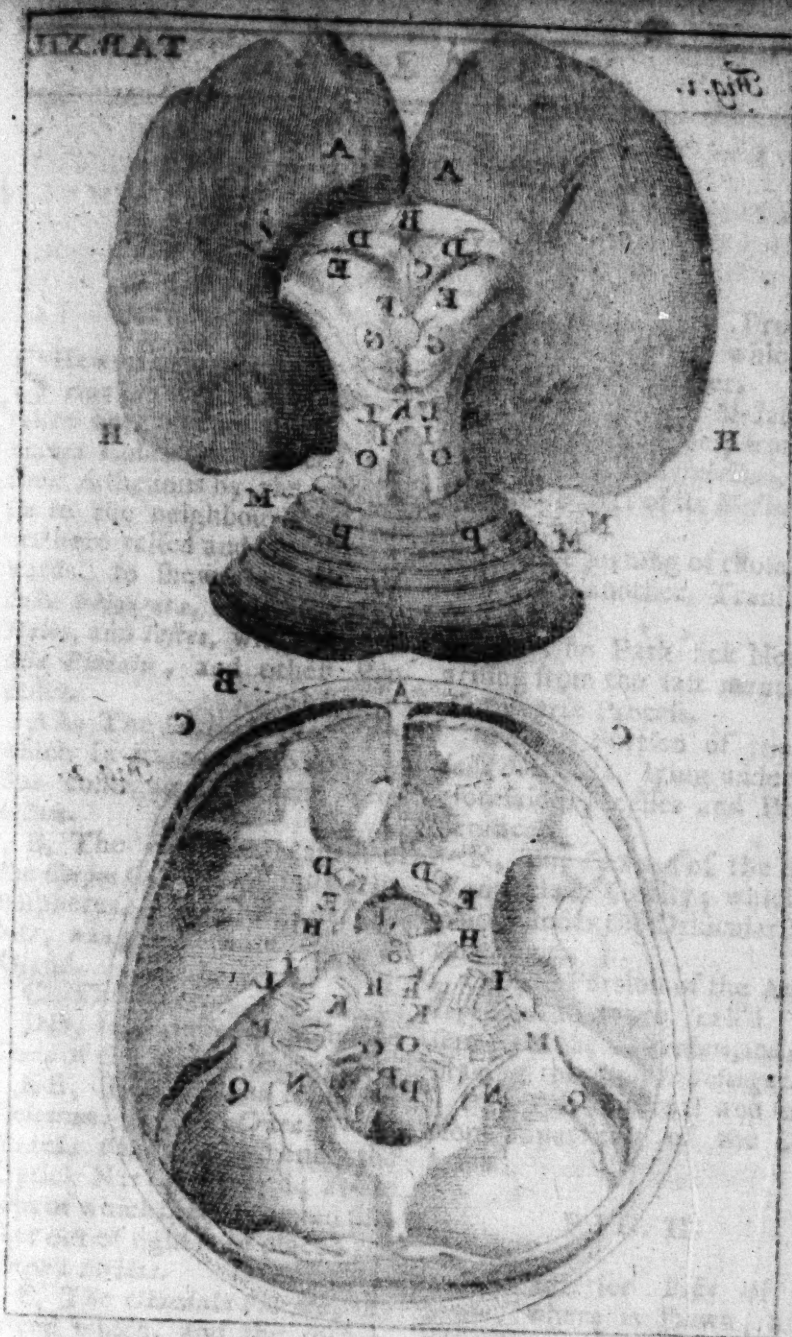
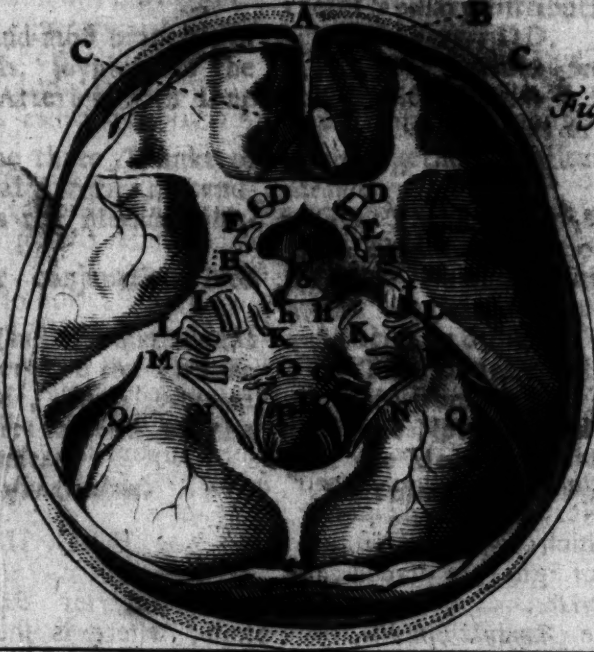


Fig. 1.



Fig. 2.



T A B. XII.

From Dr. Willis.

FIG. I.

Shews the external or superior *Superficies* of the Brain, taken out of the Skull; The hinder Lobes (being freed from their Adhesions by the *Pia Mater* to the neighbouring Parts) are here raised and turned forwards, to shew the *Crura Medullæ Oblongatæ*, the *Fornix*, the *Nates*, and *Testes*, with the *Glandula Pinealis*, and other Processes.

AA, The *Limbus* of the Brain, which in its natural Situation, was contiguous to the *Cerebellum*.

B, The *Brim* or *Margin* of the *Corpus Callosum* of both Hemispheres, which in its natural Site, was placed on the *Pineal Gland*.

C, The *Fornix*.

DD, Its Arms embracing the *Crura* of the *Medulla Oblongata*.

EE, The *Thalami Nervorum Opticorum*, on the *Crura* of the *Medulla Oblongata*, whence the *Optick Nerves* proceed; at the tops of which *Crura* (situated further out of sight) are placed the *Corpora Striata*.

F, The *Glandula Pinealis*, between which, and the root of the *Fornix*, is the *Rima ad Infundibulum*.

GG, The *Orbicular Protuberances* call'd *Nates*.

HH, The lesser *Protuberances*, call'd *Testes*, which are *Epiphyses* of the former.

II, The *Processus Medullares*, which ascend obliquely from the *Testes* into the *Cerebellum*, and constitute part of its *Medullium* on both sides.

K, The joining of those Processes by another *Transverse Process*.

LL, The *Pathetick Nerves*, arising from the last mention'd *Transverse Process*.

MM, A Portion of the *Medulla Oblongata*, lying under the afore said Processes and *Protuberances*.

N, The *Foramen* of the third *Ventricle* or *Cavity*; which, is placed under the *Orbicular Protuberances*.

OO, A Portion of the *Annular Protuberance* (call'd *Pons*) sent from the *Cerebellum*, and embracing the *Medulla Oblongata*.

PP, The external and superior *Superficies* of the *Cerebellum*.

FIG. II.

The interior *Basis* of the Skull, where is shewn, after what manner the *Blood-Vessels* and *Nerves*, when cut from the Brain and about to go out of the Skull, are cover'd by the *Dura Mater*.

S

A, The

A, The Bone of the Fore-head, in which (towards the top of the Nose) there's a Cavity, but not express'd in this Figure, as *Blancard* pretends.

B, The *Septum* of the *Os Cribriforme*, call'd *Crista Galli*.

CC, The Mammillary Processes, which are much less, and have less Cavities in them, than is found in these parts in Quadrupeds, which are indued with a more exquisite Sense of Smelling.

DD, The Optick Nerves, which in Human Bodies part farther from each other, before they pass out of the Skull, than in most Quadrupeds.

E, The Pituitary Gland, with the top of the *Infundibulum* inserted into it.

EE, The Carotid Arteries coming in, by the sides of that Gland.

g, The *Infundibulum*.

hh, The third pair of Nerves, call'd *Oculorum Motorii*, going out of the Skull.

HH, The Pathetick Nerves, hid under the *Dura Mater*, and going out of the Skull with the former, these are reckon'd the fourth Pair.

II, The fifth Pair of Nerves, hid under the *Dura Mater*.

KK, The sixth Pair of Nerves, having a very long Progress under the *Dura Mater*, before they pass out of the Skull, with the third and fourth Pair.

LL, The Seventh or Auditory Pair, entering the *Os Petrosum* with double Processes.

MM, The eighth Pair, call'd *Vagus*, compos'd of many Fibres, which joyn with the Accessory Nerve, NN, As they march out of the Skull.

OO, The ninth Pair.

PP, The tenth Pair, tending downwards, and passing under the *Dura Mater*, where the Vertebral Arteries ascend.

QQ, The Lateral Sinuses open'd.

T A B. XIII.

FIG. I. From *Dr. Willis*, the other from *Bidloo*.

FIG. I.

A Sheeps Brain, divided through its middle, and its Hemispheres turn'd over; some parts of it being scrap'd away, to shew its Medullary Tracts, or Nervous Roots.

AA, The Medullary Protuberances, call'd *Testes*, which are

Epiphyses of the *Medulla Oblongata*, and joyn'd to the *Caudex Medullaris* of the *Cerebellum*, looking from thence towards the Brain.

BB, The *Protuberantia Nati-formes*, the Substance of which, in Sheep, Goats, and many other Creatures, is partly Cortical, and partly Medullary; but in a

Man

THE TWO FLOORS OF THE BILBOY HOUSE

Man, Dogs, Foxes and others, it is wholly Medullary.

C, The Cavity, or third Ventricle, under the Prominences, which are here dissected and open'd.

DD, The two Medullary Cords of the *Caudex Medullaris*, passing strait to the *Corpora Striata*.

EE, The *Thalami Nervorum Opticorum*.

ee, The *Glandula Pinealis*, divided and laid apart.

FF, The Nervous or Medullary *Ductus*, proceeding from the Prominences, which is presently divided; one Branch G, passing to the Cone of the *Corpora Striata*, the other H, going to its *Basis*.

I, A *Surculus* from the Medullary Branch, passing at the *Basis* of the *Corpus Striatum*, and reaching to the middle of its *Limbus*.

K, The posterior *Limbus* of the *Corpus Striatum*, receiving Nervous Ducts, which are united under the Roots of the *Fornix*, with the same *Limbus* of the other side.

L, The *Corpus Striatum* of the left side whole, with the Blood-Vessels creeping on its cortical Surface.

M, The *Corpus Striatum* of the right side; the cortical Surface of which is cut off to shew its Medullary *Stria*.

NN, The foremost *Limbus* of the *Corpora Striata*, joyning in the *Corpus Callosum*.

O, The *Basis* of the *Fornix*.

P, The Trunk of the *Fornix*, cut off and turn'd back with the Brain.

QQ, The two Roots of the *Fornix*.

RR, The internal Surface of the *Corpus Callosum*, mark'd with transverse medullary *Stria*.

S, A *Sepimentum* of the Medullary *Stria*.

TT, The hinder part of the Brain, which rested on the *Cerebellum*, turn'd up.

VV, The *Cerebellum* divided and laid apart.

W, The *Medulla Oblongata* immediately below the fourth Ventricle.

FIG. II.

The *Plexus Choroides*, view'd by a Microscope.

AA, The Membranous Covering separated, which incloses the *Fasciculi* of Vessels.

B, The Arteries, and

C, The Veins (whose Ramifications and *Plexus* are made to appear) being fill'd with *Plaster of Paris*, and their own Blood.

D, The Lymphæducts somewhat distended with Wind.

E, The *Fibrillæ* of the Nerves.

F, The Glands placed between the Nerves, some of which are hard and fibrous, others are Vesiculous and more Flaccid.

FIG. III.

The Structure of a Nerve, express'd by the assistance of a Microscope.

A, The Branch of a Nerve dissected from the Neck.

B, The Blood-Vessels.

C, The *Fasciculi* of Tubes separated.

D, The Tubes cleaving by lateral Fibres.

E, The Villous Extremities of the Tubes.

T A B. XIV.

From Dr. Willis.

FIG. I.

Shews the *Basis* of a Sheep's Brain, some parts being pared away, and others exposed bare, so that the *Stria*, or Medullary Tracts, appear like so many Nerves.

AA, The Mammillary Processes carried to the *Basis* of the *Corpora Striata*, and inserted into them.

BB, The parts of the Brain remaining after the greatest part of it is cut off.

CC, The *Corpora Striata* deraised, so that the *Stria Medullares* of its internal part appear.

DD, The *Thalami Nervorum Opticorum*, in which the Medullary *Stria* pass straight, and very close towards the *Corpora Striata*.

E, A Tract leading to the *Infundibulum*.

F, A Gland placed behind the *Infundibulum*, which is double in Man.

GG, The Trunks of the Optick Nerves, divided at their joining or Coalition, before the *Infundibulum*, and turn'd off.

HH, The *Crua* of the *Medulla Oblongata*, under the *Nates* and *Testes*, in which the *Stria Medullares* pass straight, and very thick and close together towards the *Corpora Striata*.

II, The Transverse Medullary Tracts, distinguishing the

Regions of the *Medulla Oblongata*.

KK, The Annular Process passing about the *Medulla Oblongata*, nigh the *Cerebellum*.

L, The Extremity of the *Medulla Oblongata*, near the beginning of the Spinal Marrow, **M**,

FIG. II.

The Orbicular Prominences (*i. e.* the *Nates* and *Testes*) and *Thalami Nervorum Opticorum*, pared off on one side, to shew their internal Compages.

AA, The *Testes* which have straight Fibres through the whole.

B, One of the *Nates* deraised, in which the Medullary Fibres pass straight and thick towards the Brain.

C, A Medullary *Septum*, dividing the Natiiform Prominences from the Optick *Thalamus*; from which one Medullary Process passes to the *Basis* of the *Corpus Striatum*, the other into its *Cone*.

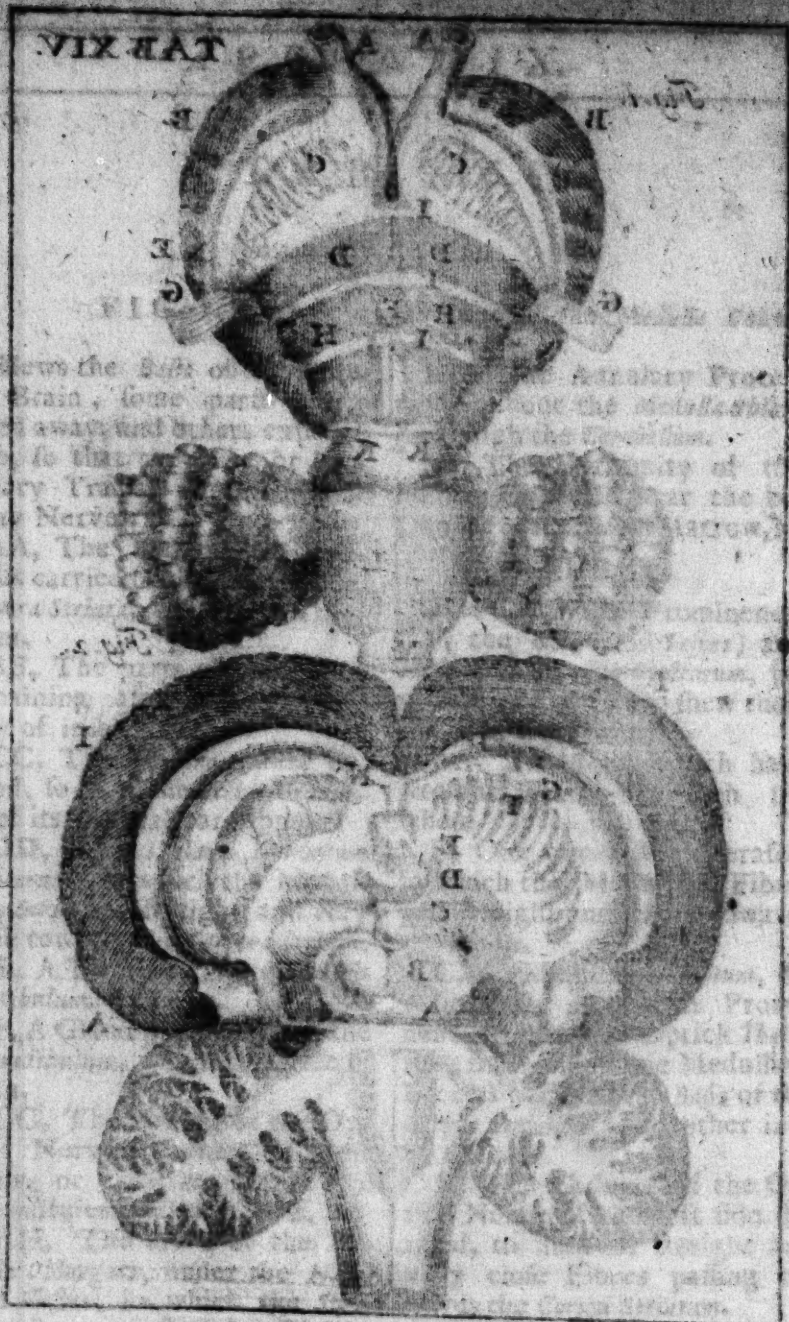
D, The *Thalamus* of the Optick Nerve of the left side deraised, to shew its straight and very close Fibres passing towards the *Corpus Striatum*.

E, The posterior *Limbus* of the *Corpus Striatum*, receiving the Optick Medullary *Stria*, and those of other Medullary Processes.

F, The



TAB. XIV.



Shows the Brain, Cerebrum, Cerebellum, Brainstem, and the associated structures of the head and neck.

A, The Cerebrum, B, Cerebellum, C, Brainstem, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z.

The Cerebrum is the largest part of the brain, and is responsible for the higher functions of the mind, such as thought, memory, and emotion.

The Cerebellum is a smaller part of the brain, located at the back and bottom, and is responsible for the coordination of movement and balance.

The Brainstem is the part of the brain that connects the cerebrum and cerebellum to the spinal cord, and is responsible for the basic functions of life, such as breathing and heart rate.

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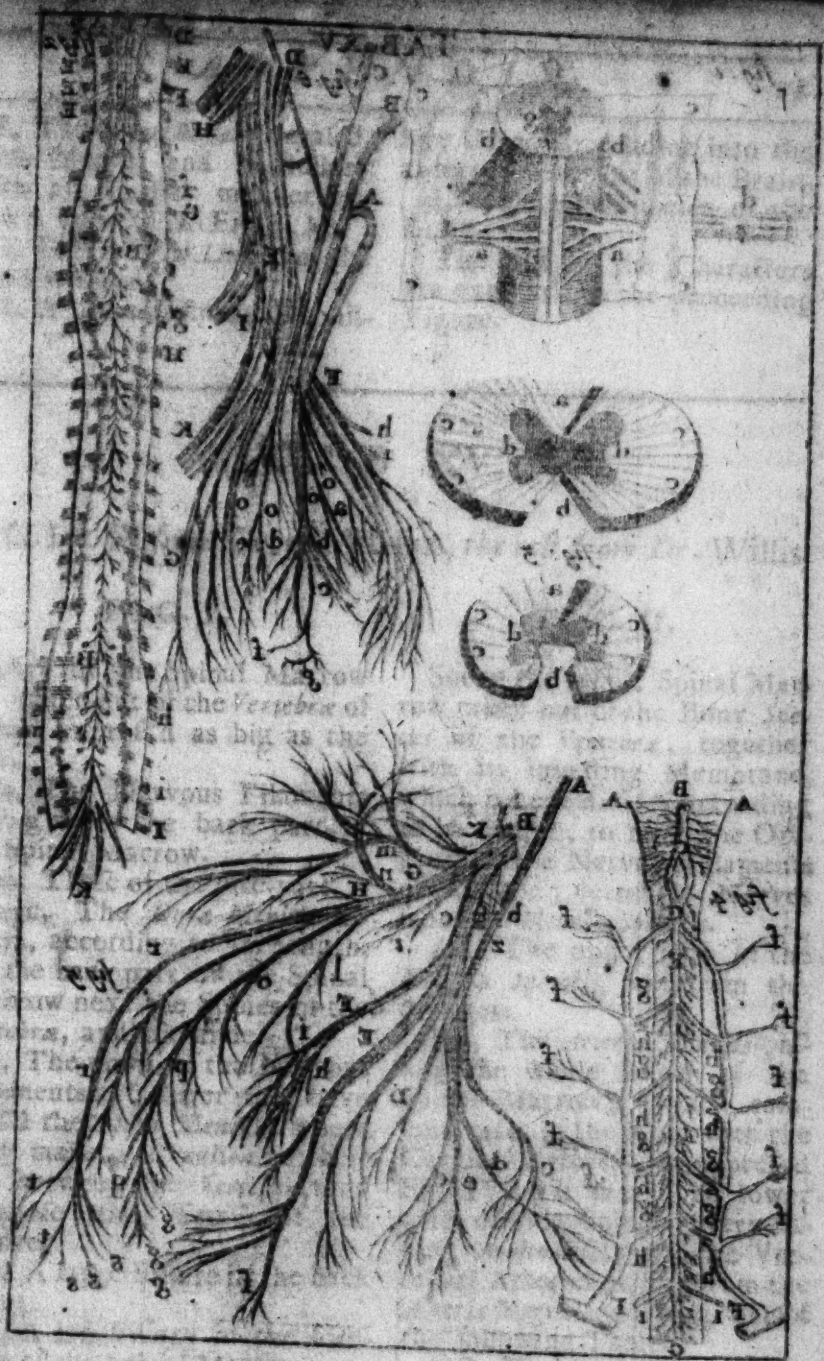
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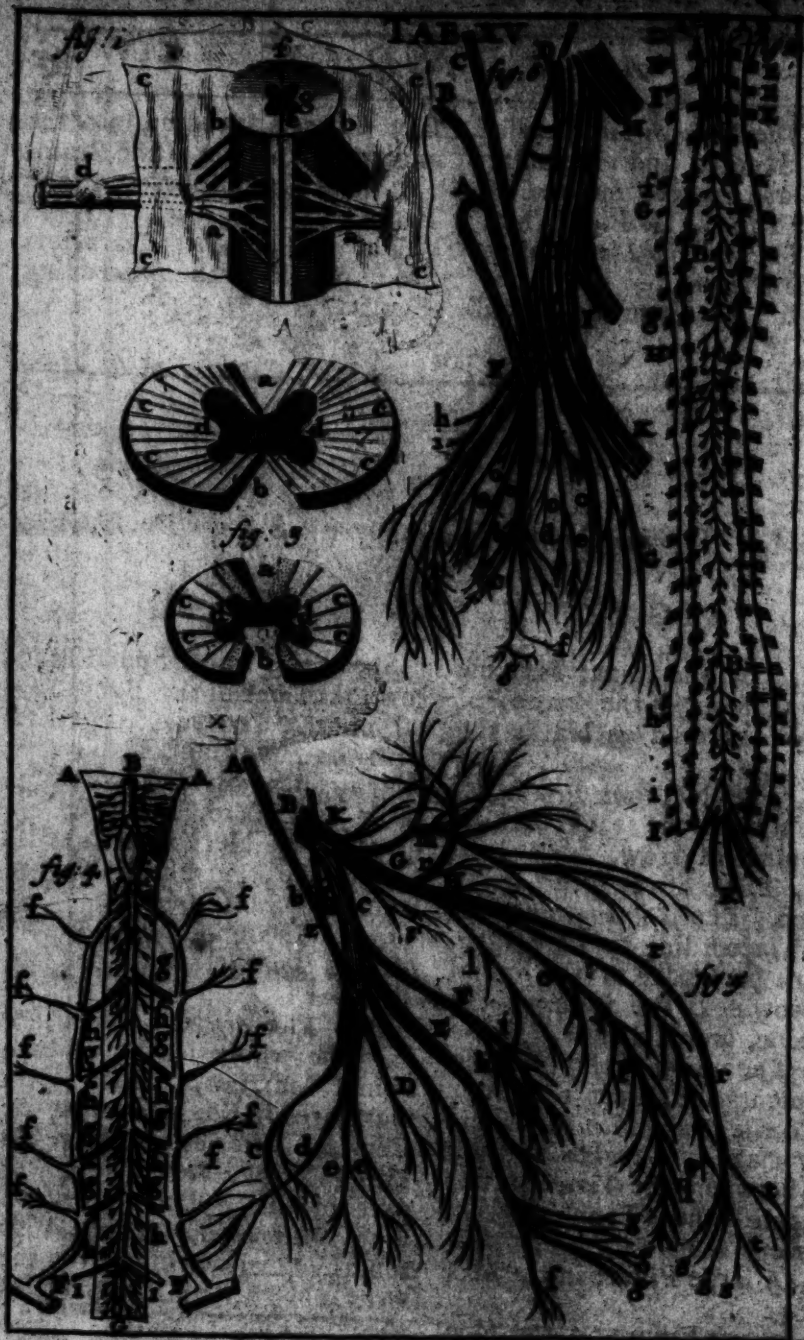
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F, The *Corpus Striatum* erased, whole Nerves and Medullary Ducts are in like manner express'd Tab. XIII. Fig. I. M.

G, The *Anterior Limbus* of the *Corpus Striatum*.

H, A *Sinus* from the Mamil-

lary Process, leading into the anterior Ventricle of the Brain.

I, The Hemispheres of the Brain.

The rest of the Characters are explain'd in the preceeding Figure.

T A B X V.

FIG. I & III from Gerard Blasius, the rest from Dr. Willis.

FIG. I.

Part of the Spinal Marrow taken out of the *Vertebra* of a Dog, express'd as big as the Life.

aa, The Nervous Filaments arising from the back part of the Spinal Marrow.

bb, Those of the fore-part.

cccc, The *Dura Meninx* divided, according to its length, on the back part of the Spinal Marrow next the Spines of the *Vertebra*, and laid aside.

d, The union of the Nervous Filaments a, b, after they have pass'd the *Dura Meninx*, where they make a *Ganglion* at their exit between the *Vertebra*, and compose the Trunk of the Nerve.

e, A large Fissure in the back part;

f, A less Fissure in the fore-part of the Spinal Marrow.

g, The internal Cortical Substance, of a Cineritious colour.

FIG. II.

Shews the whole Spinal Marrow taken out of the Bony *Specus* of the *Vertebra*, together with its investing Membrane, which is here divided according to its length, to shew the Originals of the Nervous Filaments of all the vertebral Nerves from the *Medulla Spinalis*.

AA, The upper part of the *Medulla Spinalis*, cut from the *Oblongata*.

BB, The *Arteria Spinalis* passing the whole length of the Spinal Marrow, which communicates in the Neck with the Cervical Arteries, as express'd Fig. IV. gh &c. The lower part of this Spinal Artery having *Anastomoses* with the Vertebral Arteries arising from the *Arteria Magna*. vid. Fig. II. of the following Table.

CC, The *Nervus Spinalis* by Dr. Willis, call'd *Accessorius*, arising about the 5th and 6th *Vertebra* of the Neck, and going out

out of the Skull with the *Par Vagum*.

DD, The *Dura Mater*, or investing Membrane of the Spinal Marrow, divided according to its length, and expanded.

EE Ff, The Nerves of the Neck.

Gg, The Nerves that pass to the Arms, and arise from that part of the *Medulla Spinalis* that is somewhat dilated, and have larger nervous *Fasciculi* at their *Originals*.

Hh, The Nerves of the Back, where the Spinal Marrow is lessened again.

Ii, The lower part of the Spinal Marrow, which sends Nerves to the Loins and Legs, and is intirely Fibrous in Human Bodies, but is Medullary in most Quadrupeds, and is there somewhat dilated again.

K, The Nerves passing out of the *Os Sacrum*.

FIG. III.

Part of the Spinal Marrow of a Dog cut tranversly.

aa, The lesser Fissure before.

bb, The larger Fissure on the hind part.

ccc, The Nervous or Medullary *Stria*, tending from the Cineritious or Glandulous Substance to the Circumference.

ddd, The Glandulous Substance plainly distinguishable from the Nervous or Medullary.

FIG. IV.

The Ramifications of the Vertebral Arteries, both in the

upper part of the *Medulla Spinalis*, and back part of the *Medulla Oblongata*.

AA, The back part of the *Medulla Oblongata*.

B, Both the Vertebral Arteries united.

C, The Rhomboid Figure, which represents a double Coalition of the Arteries in Brutes.

D, The meeting of the Vertebral and Cervical Arteries on the *Medulla Spinalis*, from whence the Spinal Artery descends,

E, The Spinal Artery.

FF, The two Vertebral Arteries arising from the Axillary Arteries.

G, The *Medulla Spinalis*.

ff, or, The Arteries that go to the Muscles of the Neck.

gg, The Branches sent to the Spinal Marrow, which joyn at both sides in the Spinal Artery, at each meeting of the *Vertebra*.

hh, Branches of Arteries which pass into the Channels of the *Sinuses*, and make an Arterious *Plexus*.

ii, The Arteries sent from the *Aorta* into the Spine.

FIG. V.

The Ramifications of the 5th and 6th Pair of Nerves.

A, The Nerve of the sixth Pair from the Trunk, of which the Doctor says, are sent two shoots into two of the Muscles of the Eye at a a, which are not express'd in this nor his original Figure.

Z, A Branch of the Nerve of the sixth Pair, reflected for the

the Root of the Intercoſtal Nerve.

B, The Trunk of the fifth Pair, immediately before it is divided in two large Branches.

bb, Two Shoots reflected from one of the Branches for the Root of the Intercoſtal Nerve.

C, The Division of the upper Branch into leſſer Branches, of which the ſuperior c is the Ophthalmick, which enters the Orbit of the Eye, and ſends out four Branches; The firſt (O) is reflected into the Noſtrils; The ſecond (d) paſſing the outside of the Orbit of the Eye, runs into the Muſcles of the Forehead; The third and fourth (ee) are diſtributed to the *Palpebra* and internal Glands of the Eye.

D, The ſecond Branch of the ſecond Division alſo enters the Orbit, and paſſes towards the external Angle of the Eye, and is diſtributed to the *Palpebra* and exterior Glands.

E, The third Branch of the ſecond Division, paſſes by or under the Orbit of the Eye, marching through a hole in the Bone of the upper Jaw, in which paſſage it ſends a Branch (e) by another *Foramen* into the *Muſculus Maſſeter*.

f, A Branch running to the Muſcles of the Noſe.

ggg, Divers Branches deſcending into the upper Lip.

F, The inferior Branch, or fourth of the ſecond Division, which deſcending ſtrait towards the Roof of the Mouth, is divided into two Branches, of which one of them (h) is

diſtributed into the Gums; the ſecond (i) is diſſeminated with many Twigs into the Palat.

G, The ſecond Branch of the firſt Division of the *Par Quintum*, which paſſing ſtrait downwards into the lower Jaw, in its way ſends many Branches; as follows,

K, One of its Branches to the Parotid Gland;

l, Another to the internal Maſſicatory Muſcles;

m, Another Branch paſſing round the Proceſs of the lower Jaw, is carried to the external part of the *Maſſeter*;

n, Another *Surculus* running oppoſite to the former, on the ſame Proceſs, and diſtributed into the internal part of the ſame Maſſicatory Muſcle.

H, A Trunk of a great Branch paſſing further on, is divided into divers Branches; of which that at O tends to the Root of the Tongue; P That which goes to the whole Body of the Tongue with many Branches; q Thoſe that paſs to the parts under the Tongue; rr The Trunk that paſſes through the lower Jaw, and gives ſlips to the Teeth, and to the lower Lip ſſſ; and partly to the Chin tt.

FIG. VI.

All the Nerves of the third, fourth, fifth and ſixth Pairs, that paſs to the Muſcles, and other parts of the Eye.

A, The Nerve of the third Pair, which paſſes to three of the ſtrait Muſcles, and the external

external oblique Muscle of the Eye.

B, A Nerve of the fourth Pair, or Pathetick Nerve, passing into the *Musculus Trochlearis*.

C, A Nerve of the sixth Pair, proper to the *Musculus Abducens*, and *Septimus Brutorum*.

D, A Nerve of the fifth Pair, whose Ophthalmick Branch (E) is divided into two; F The upper Branch is presently split into several Twigs, marching strait to the internal Angle of the Eye; G The lower Ophthalmick Branch divided into Branches, and in a like manner passes to the Gland and *Palpebra*, at the external Angle of the Eye.

a, A Nerve of the fifth Pair, passing to the *Musculus Trochlearis*:

b, A Branch of the Third, to the *Attollens*:

c, Another Branch of the same, to the *Abducens*:

d, Another of the same, to the *Deprimens*:

f, Another to the *Musculus Obliquus Externus*:

g, Little Nerves from the Plexus of the third Pair, passing through the Sclerotick Tunick into the *Uvea*.

e, A Nerve of the sixth Pair, to the *Musculus Abducens*.

ooo, Fibres or little Branches from the fourth and sixth Pair, passing to the *Musculus Septimus Brutorum*.

n, A Nerve from the upper Ophthalmick Branch, going into the Nostrils (i); One from the same Branch into the Eyebrows and Forehead.

H, The Trunk of the fifth Pair cut off, which went to the lower Jaw.

I, Another Trunk of the same, which went to the Palat, also cut off.

K, The Branch of the upper Jaw.

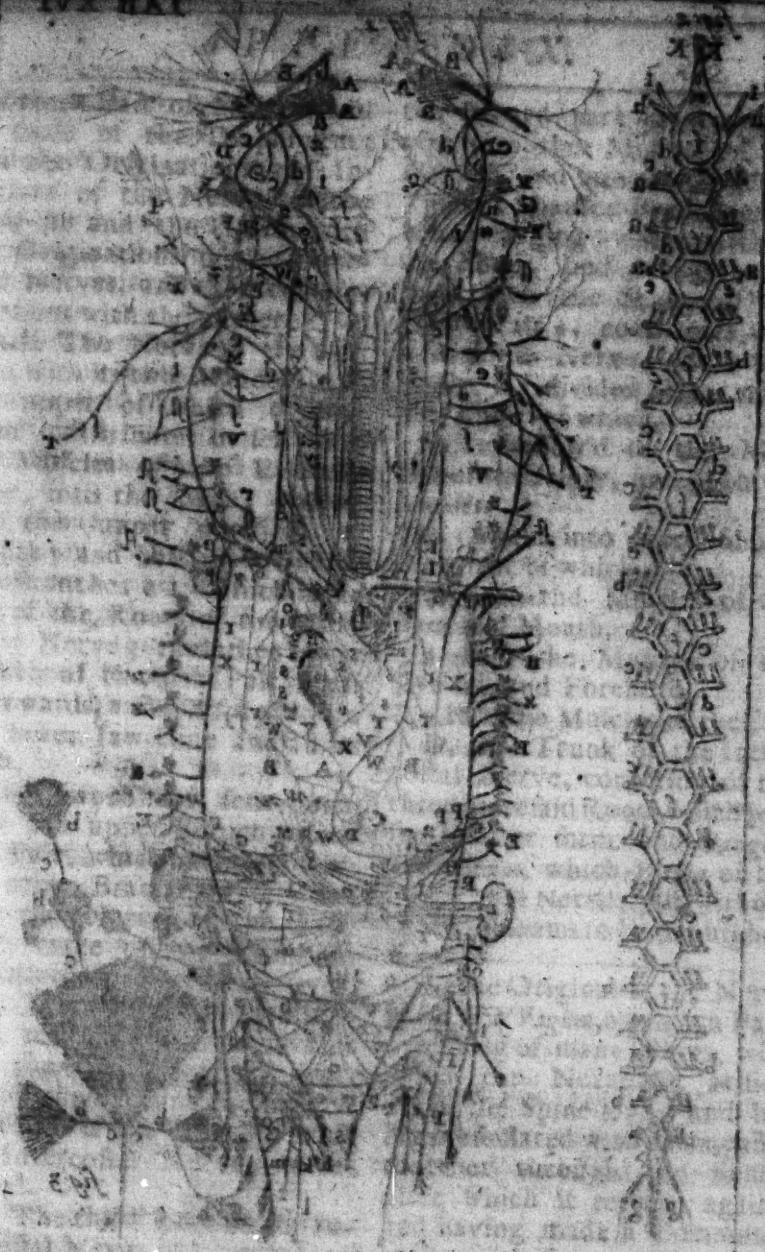
T A B. XVI.

From Dr. Willis, but very ill copy'd, wherefore the Original Figure is here referr'd to; see the Doctor's ninth and eleventh Tables of his *Anatomy of the Brain*.

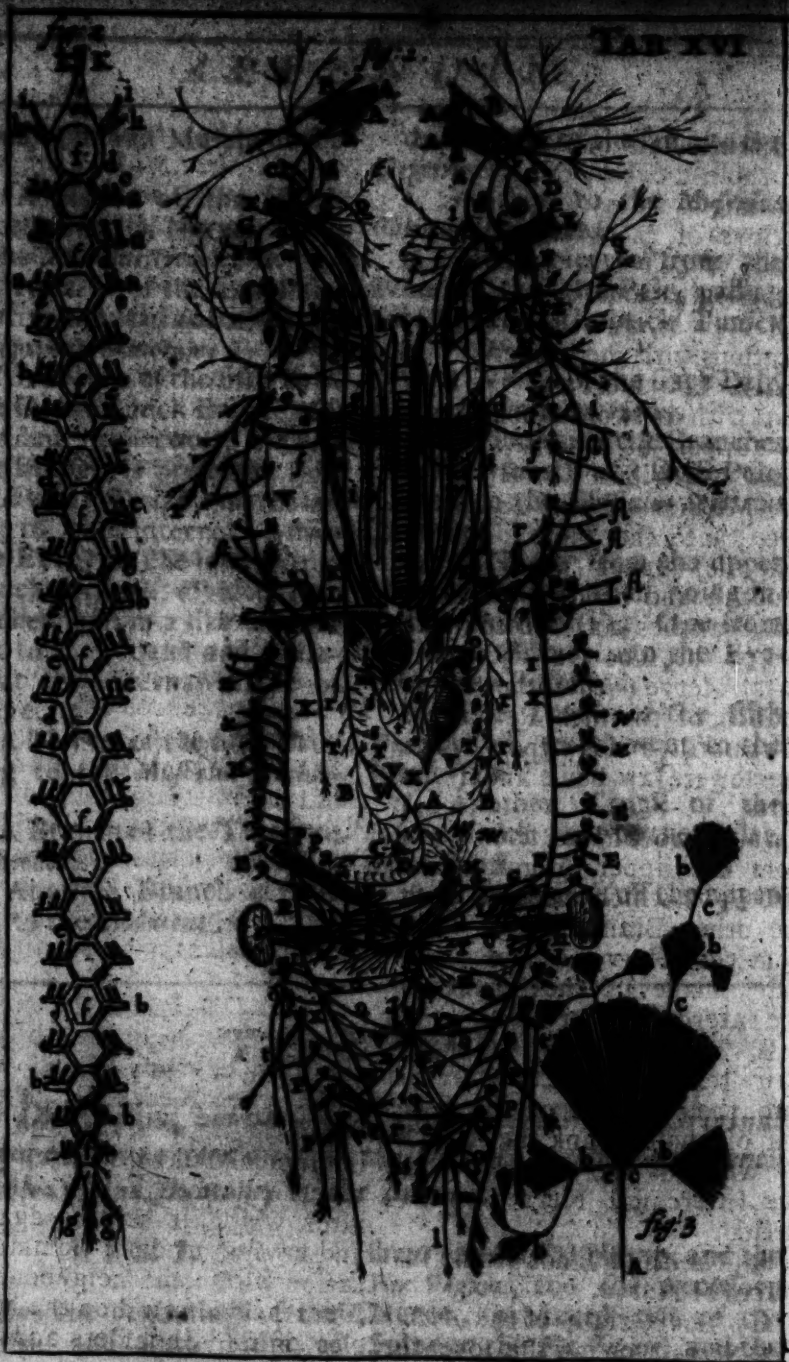
F I G. I.

SHews the beginnings of the fifth and sixth Pairs of Nerves, and the Roots of the Intercostal Nerve proceeding from them; likewise the Origins and Branchings of the

same Intercostal Nerve, and the *Par Vagum*, and the Accessory Nerve, produced out of the Spine to the *Par Vagum*, and the Ramifications carried to the Stomach: Here also are represented the Beginnings and Distributions of the seventh, ninth and



The illustration shows a plant with a central stem and branching leaves. The leaves are long and narrow, with a feathery or pinnate structure. The plant is shown in a growing state, with several small, round, seed-like structures visible on the branches. The drawing is detailed, showing the texture of the leaves and the structure of the stem. The letters and numbers are used to identify specific parts of the plant, such as the stem, leaves, and seed structures.



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and tenth Pair of Nerves, and of those of the Diaphragm; also the Originations and Insertions of the Nerves of the *Præcordia* and the *Viscera*, with the Originations of the vertebral Nerves, and their communications with the former.

AA, The Nerve of the fifth Pair, with its two Branches AA, the upper of which tending strait, distributes it self into the Muscles of the Eye and Face, into the Nose, Palate, and the upper part of the Mouth; and besides, it reflects two Branches a a, which make two of the Roots of the Intercostal Nerve; the other lower Branch of the fifth Pair tends downwards, and is dispers'd into the lower Jaw-bone and all its parts.

a a, Two Shoots sent down from the upper Branch of the fifth Pair, which meeting with the other Branch b, reflected from the Nerve of the sixth Pair, make up the Trunk of the Intercostal Nerve D.

B, The Nerve of the sixth Pair, tending strait downwards into the Muscles of the Eye, out of whose Trunk the Branch b, which is the third Root of the Intercostal Nerve, is reflected.

b, The third Root of the Intercostal Nerve.

C, The Origin of the *Auditory Nerve*, or of the seventh Pair, with its double Process, viz. the soft and hard.

c, The softer Branch of it, which is wholly distributed into

the inward part of the Ear, viz. into the Muscles of the *Hammer*, and into the *Cochlea*.

d, The harder Branch of it, which arising whole without the Skull, and being inosculated with the Shoot of the eighth Pair e, constitutes with it a single Nerve, which presently is divided into more Branches; of which,

1, Is bestow'd on the Muscles of the *Tongue*, and of the *Oss. Hyoides*.

2, Again into more Shoots the upper of which,

3, Into the Muscles of the Face and Mouth,

4, Into the Muscles of the Eye-lids and Forehead,

5, Into the Muscles of the Ear.

D, The Trunk of the Intercostal Nerve, consisting of the three aforesaid Roots, which presently after forms the *Gangliform Plexus*, which *Plexus* of the Intercostal Nerve, just without the Skull, seems to be the highest Knot.

E, The Original of the Nerve of the *Par Vagum*, or eighth Pair, consisting of many Fibres, with which the Nerve G, arising out of the Spine joyns, and being inosculated with them, passes together through the Skull, after which it returns again, and having made a Communication with some neighbouring Nerves, is bestow'd on the Muscles of the Shoulders and the Back.

e, A Shoot of the eighth Pair, meeting with the Auditory Nerve.

d

fff, Other

fff, Other Branches of the *Par Vagum* going into the Muscles of the Neck.

G, The principal Branch of the same Pair hid in the Ganglioform Process.

H, The upper Ganglioform Plexus of the *Par Vagum*, which admits a Branch k, out of another neighbouring Plexus of the Intercoastal Nerve.

h, A Branch out of the aforesaid Plexus of the *Par Vagum* going into the Muscles of the *Larynx*, a considerable Branch of which, going under the Scutiform Cartilage, meets with the returning Nerve, to which it is joyn'd.

i, A Branch sent from the cervical Plexus of the Intercoastal Nerve into the Trunk of the *Par Vagum*.

K, The lower Plexus of the *Par Vagum*, from which very many Nerves go to the Heart, and the Parts about it.

l, A remarkable Branch sent into the Cardiac Plexus.

m, Nervous Fibres distributed into the *Pericardium*, and Vessels joyning to the Heart.

n, The left recurrent Nerve, which, being reflected upwards towards the Scutiform Cartilage, near which it compasses about the Trunk of the *Aorta*, in its ascent sends many Branches + + + to the *Aspera Arteria*, and then meets with a Shoot h, sent from the Ganglioform Plexus. This returning from that Plexus, sends some Shoots towards the Heart.

L, The right recurrent Nerve,

which being reflected much higher, binds about the Axillary Artery.

O, A notable Branch sent down from the Trunk of the *Par Vagum* of the left side to the Heart, and presently dividing, one Branch passes about the Trunk of the Pneumonick Vein, the other gently touching the back part of the Heart, is dispers'd into more Branches which lye over its Superficies; from this Pair is sent a Cardiac Branch from the Trunk of the other side.

p, A Branch of the aforesaid Shoot going about the Pneumonick Vein.

q, Another Branch of the same, sending many Shoots to the Heart, which lye over its hinder Superficies.

r r r, Small Branches sent out from the Trunk of the *Par Vagum*, which are joyn'd in a long Tract with the *Vesophagus*, being turn'd back from their proper place.

SSS, Many Branches cut off, whose Shoots being distributed into the Substance of the Lungs, variously straiten and bind about the Sanguinary Vessels.

TTT, The Trunk of the *Par Vagum* is divided into two Branches, viz. outward and inward, both of which inclining towards the like Branches of the other side, are joyn'd to them, and after a mutual Communication, make up the two Stomachick Branches, viz. the upper and lower.

VV, The internal Branches which

which being united in X, constitute the beginning of the inferior Stomachick Branch.

WW, The outward Branches, which being united in the Figure to be added to this, make the other Stomachick Branch.

X, The joyning of the inward Branches.

F, The beginning of the Nerve of the ninth Pair, with many Fibres, which being united make a Trunk which is carried towards the Tongue, and in its Progress sends down two Branches.

⊙⊙, The first Branch tending downwards, which being united to a Branch of the tenth Pair, is bestowed on the Sternothyroidal Muscle.

⊙⊙, The second Branch is sent into the Muscles of the *Oesophyoides*.

⊙, The Trunk of this Nerve passing into the Body of the Tongue.

G, The upper Ganglioform Plexus of the Intercostal Nerve, which is the last Knot of this Nerve coming out of the Skull.

α, A Branch out of this Plexus sent into the neighbouring Plexus of the *Par Vagum*.

bb, Two nervous Processes, by which this Plexus communicates with the Nerve of the tenth Pair.

c, A Shoot sent down into the *Sphincter Gulae*.

d, The middle or *Cervical Plexus*, which being proper to a Man, lies nigh the middle of the Neck, in the Trunk of the *Intercostal Nerve*.

e, A noted Branch out of the second vertebral Pair, going into this Plexus, whereby this communicates with the Nerve of the *Diaphragm* in its first Root.

ff, Two Branches going from the same Plexus into the Trunk of the Nerve of the *Diaphragm*.

gg, Many nervous Fibres going out of the *cervical Plexus* into the current Nerve, and to the sanguinary Vessels to the Trunk of the *Trachea* and *Oesophagus*.

h, A Branch from the same into the Trunk of the *Par Vagum*.

ct, Another noted Branch going into the returning Nerve.

ii, Two remarkable Shoots sent towards the Heart, which another Branch arising a little lower follow, these being carried downwards between the *Aorta* and the *Pneumonick Artery*, and meeting with the like Branches of the other side, constitute the *Cardiack Plexus* Δ from which the chief Nerves proceed that are bestowed on the Heart.

λ, A Branch proceeding a little lower from the *Intercostal Trunk*, which goes with the former to the *Cardiack Plexus*.

Δ, The aforesaid *Cardiack Plexus*.

μ, A Link going from the same, which compasses about the *Pneumonick Artery*.

ν, The lower Link inclosing the *Pneumonick Vein*.

ξ, The *Intercostal Nerve* demers'd into the Cavity of the

d 2

Thorax,

Thorax, where it binds the axillary Artery.

ξξξξ, The four vertebral Nerves sent down into the *Plexus* of the *Thorax*, the upper of which binds the vertebral Artery.

ooo, Three noted Branches sent down from the same *Plexus*, which lie over the fore-part of the Heart, as the Nerves p, q, coming from the Trunk of the *Par Vagum*, give Branches to its back part.

π, The vertebral Artery bound about by the aforesaid Nerve.

ςςς, Nervous Shoots covering the fore-part of the Heart.

τττ, Branches and nervous Fibres sent into its back part.

Θ, The inferior *Plexus* properly call'd the Intercoastal or Thoracick, into which four Vertebrals, beside the Intercoastal Nerve are inserted, the uppermost of these in its descent passes about the vertebral Artery.

I, The Intercoastal Nerve descending through the Cavity of the *Thorax* just by the Roots of the sides, where in its whole progress it admits a Branch from between each *Interrodium* of the *Vertebra*.

H, The Nerve of the tenth Pair, consisting of many Fibres in its beginning, and passing out between the first and second *Vertebra*, where it presently sends forth two nervous Processes b, into the superior *Plexus* of the Intercoastal Nerve.

*, Its Branch, which being

united to the Shoot of the ninth Pair, is bestow'd into the *Sternothyroeidal Muscle*, immediately lying upon the *Aspera Arteria*.

□, The Branch sent into the posterior Muscles of the Neck.

Δ, A Branch sent into the pathetick Spinal Nerve.

*** Shoots from the chief Branch of the same Nerve, sent into the *Sternothyroeidal Muscle*.

L, The Origin of the first vertebral Nerve, which in this, as well as in all other Vertebrals, consists of many Fibres, one band of which going out of the lower Margin of the Spinal Marrow, and the other from the upper meeting one another, grow together into one Trunk, which presently is divided into divers Nerves distributed many ways.

p, A Shoot from this Nerve into the Branch of the tenth Pair.

σ, Another Shoot into the Spinal Pathetick Nerve.

s, A noted Shoot sent forth upwards into the Muscles of the Neck.

T, A Shoot from the crooked Nerve into the anterior Muscles of the Neck.

Z, A Nerve from this pair into the first brachial Nerve, out of which the Nerve of the Diaphragm hath its highest root.

M, The Origin of the second vertebral Nerve, whence the highest brachial Branch (V) proceeds, and in which the Nerve

Nerve of the Diaphragm is first rooted. This brachial Nerve in Quadrupeds arises high to the 4th or 5th *Vertebra*, and therefore the *Radix* of the Diaphragm is placed lower.

V, The vertebral Branch going to the Arm.

Y, The Nerve of the Diaphragm, a Branch of which δ goes from the Cervical *Plexus* to its root, and a little below two other Branches $\epsilon\epsilon$ pass into its Trunk from the same *Plexus*; this Communication is peculiar to Humane Bodies.

ϕ , The other Root of the Diaphragm from the second and third brachial Nerve.

χ , The lower Trunk of the Nerve of the Diaphragm removed, which in its proper place passing through the Cavity of the *Thorax* without any Communication, goes straight to the Diaphragm, where being stretch'd out into three Branches, it is inserted in its muscular part.

↓↓↓↓, The other brachial Nerves, out of whose Roots Branches go into the intercostal *Plexus*.

$\omega, \omega, \omega, \omega$, The Origins of the vertebral Nerves from the several Roots of which, a Branch is carried into the intercostal Nerve.

ψ, ψ , The last Origin of the Spinal accessory Nerve, that goes to the *Par Vagum*, beginning with a sharp point.

φ , The ascending Trunk of the same Nerve, which in its whole ascent passing by the side

of the Spinal Marrow, passes through the midst of the Origins of the vertebral Nerves, and receives Fibres at the Trunk of the Marrow.

δ , The descending Trunk of the same Nerve, which going from the *Par Vagum*, is reflected outwards, and after it hath had communication with the Nerves of the ninth and tenth Pair, is bestow'd wholly upon the Muscles of the Shoulders.

γ , The lower Process of the same Nerve.

The following Characters are repeated on the lower part of this Figure, which makes the 11th Table of Dr. *Willis*, and shew the interior Ramifications of the Nerves of the *Par Vagum*, and of the Intercostals, distributed to the Ventricle and the *Viscera* of the whole *Abdomen*. Likewise the Origins of the vertebral Nerves are describ'd, which stand over-right the former, and are inosculated with some of them. The Figure in these, and in four-footed Animals, are almost alike, so that this Figure may be common to both.

A, The lower Stomachical Branch, which is made up of the internal Branches of both sides of the *Par Vagum*, being united together, and covering the bottom of the Ventricle, disperses Branches on every side in the whole Tract.

B, The upper Stomachical Branch, which is made of the external Branches of both sides of

of the *Par Vagum*, being united together, creeps through the top of the Ventricle.

C, The Coalition or joyn-
ing together of the external
Branches.

D, The *Plexus Nervosus* of the
Fibres of both the Stomachical
Nerves, united together nigh
the Orifice, and as it were
woven into a Net.

a a, The Extremities of both
the Stomachical Nerves, which
there meet with the Nerves of
the Liver and communicate with
them.

EE, The intercostal Nerve
descending on either side nigh
the Roots of the Ribs, and in
its whole descent receiving a
Branch from the several verte-
bral Nerves &c.

F, A Branch going out of
the Intercostal Nerve of the
left side, and sent down towards
the Mesenterick *Plexus*.

G, The same Mesenterick
Nerve divided into two, sends
the greater Branch into the
Plexus, which is the Stomachi-
cal, and the Splenetick, and the
lesser into the *Plexus Renalis*.

H, The like Mesenterick
Branch coming from the inter-
costal Nerve of the right side,
and bending towards the Mesen-
terick *Plexus*.

I, This Nerve being divided,
parts with its great Branch to
the Hepatick *Plexus*, and the
lesser into the *Plexus Renalis*.

I₁, The chief Mesenterick
Plexus of the left side, which is
the Stomachical and Lienary;
from which many little com-

panies of Nerves, or numerous
Conjugations, are sent out many
ways.

Y, The renal Mesenterick
Plexus of the left side, into
which, besides the Mesenterick
Branch

ββ, Two other Nerves are
immediately carried out of the
intercostal Nerve.

γγγ, From this *Plexus* plac-
ed nigh the Gall-Bladder, more
Nerves and Fibres are sent into
the Kidney.

δδ, Nerves and Fibres, by
which this *Plexus* communicates
with the greatest *Plexus* of the
Mesentery.

ζ, The chief bundle of Nerves
tending out of the former *Plexus*
(I₁) into the Spleen, which it
having reach'd, reflects from
thence into the bottom of the
Ventricle.

η, The second Conjugation
of the Nerves from the afore-
said *Plexus* into the bottom of
the Ventricle, whose Fibres
communicate with the Fibres
and Branches of the lower Sto-
machical Nerve.

θ, The third Conjugation of
Nerves between this *Plexus* and
the neighbouring Hepatick δ.

ι, The fourth Conjugation of
Nerves between this and the
greatest *Plexus* of the Mesen-
terick Θ.

κ, The Renal Mesenterick
Plexus of the right side, into
which (as in its fellow) beside
the Mesenterick Branch.

λλ, Two Nerves produced
from the intercostal Nerve.

α, The Nerves and Fibres
between

between this *Plexus* and the greatest of the Mesenterick.

μ, A noted Branch between this *Plexus* and the neighbouring Hepatick v.

ν, A noted company of Nerves and Fibres from this *Plexus* into the Kidney, which climbing up the emulgent Vessels variously pass about them.

δ, The superior Mesenterick *Plexus* of the right side, which also is the Hepatick.

ο, A great Conjugation of Nerves out of this *Plexus* into the Liver and Gall-Bladder, out of which likewise many Branches are sent into the *Pylorus* and *Pancreas*. The Nerves and Fibres of this in its ascent towards the Liver, cover the Hepatick Artery as it were, by making a Net, and almost hide its Trunk; the Branches of these meet with the tops of the Stomachical Nerves a a.

π π, Shoots distributed about the *Pylorus*.

ρ ρ, Other Shoots dispers'd into the *Pancreas*.

ς ς, Nerves reaching out between this *Plexus* and the greatest of the Mesentery. This *Plexus* communicates with the neighbouring Renal by (μ) and with the Stomachical by (θ). The greatest Mesenterick *Plexus*, out of which a great bundle of Nerves arising under the great *Glandula* of the Mesenterick, from thence is dispers'd every where about into very many Branches and Shoots, and are distributed into all the Intestines (except the *Rectum*.)

These Nerves and Fibres reaching out on every side, accompany the Mesenterick Arteries and Veins, and variously pass about them in their whole progress.

τ τ, Nervous Branches from this *Plexus* into the Womens Testicles or uterine *Glandula*, which meet with the Branches of the vertebral Nerves of the 20th and 21st Pair, sent into the same parts, and are inosculated with them.

υ υ, The vertebral Nerves which go into the Womens Testicles.

ϑ, The lowest *Plexus* of the Mesentery placed far below the former, and having for its origin three Nerves arising lower from the Intercostals.

φ φ φ, Three Nerves sent down on either side from the Intercostal Nerve into the lowest *Plexus* of the Mesenterick.

χ χ, A Nerve stretch'd out from that *Plexus*, directly into the greatest *Plexus* of the Mesentery, which in its passage receives on both sides some Branches from the intercostal Nerve, viz. 44. 5. 5. 5. and it self send two Branches into the Womens Testicles.

↓ ↓, Two Branches from the aforesaid Nerve into the Womens Testicles.

ϕ, Another small *Plexus* standing a little above this lowest.

ω, A nervous Process from the aforesaid lowest *Plexus* stretch'd out into a small neighbouring *Plexus*.

a, From

a, From the least *Plexus* Q a noted Nerve being carried into the greatest *Plexus* of the Mesentery, which in its whole ascent goes under the *Rectum* and part of the *Colon*, and inserts many Branches in the same.

b, Another Branch sent downwards from the same *Plexus*, which goes under the lower part of the same straight intestine, and bestows upon it many Shoots.

cc, Two Nerves sent downward from the lowest *Plexus* of the Mesentery D, which being sent down into the *Pelvis* of the *Abdomen*, go under the two *Plexus's* there K. K. viz. one placed on either side.

KK, A double *Plexus* placed within the *Pelvis*, whose Nerves are employ'd in the several Excretions there made (viz.) the Urine, Excrement, and Seed; these send out Nerves dd towards the lowest Mesenterick *Plexus*.

dd, A Nerve ascending from the aforesaid *Plexus* on either side nigh the side of the *Rectum*, and sends Shoots into it, which double *Plexus* meets with another Nerve b descending from the least *Plexus*.

ee, Two Nerves from the same *Plexus* into the Womb.

f, A Nerve from the same *Plexus* into the Bladder.

g, A Nerve into the *Prostata*.

h, A Nerve out of the Root of the 28th vertebral Pair, into the Muscle of the *Anus*.

i, The 29th vertebral Pair, from which

k, A Nerve into the Sphincter, and the other Muscles of the *Anus*.

l, A noted Nerve on both sides from that Pair into the *Penis*.

m, Another shorter Branch into the Muscles of the *Penis*.

LL, The intercostal Nerve below the Kidneys.

m, A little Nerve from the vertebral Branch, which passes into the *Cremaster* Muscle of a Man's Testicles.

n, The 21st vertebral Pair, whose origin being placed behind the Kidneys lies hid; from this Nerve more Shoots are sent out on both sides into the Testicles of the Female Sex, which meet with other mesenterick Shoots distributed to the same part.

o, A Nerve out of the 22d vertebral Pair, from which also some Branches are sent into the Womens Testicles.

ppp, &c. Nerves which pass to the Thighs, of which those that rise higher receive in their descent Branches from the Nerves arising lower.

q, The intercostal Nerves mutually bending one to another near the beginning of the *Os Sacrum*, communicates by the cross Process.

r, Another cross Process within the bending of the *Os Sacrum*, joining the two intercostal Nerves.

S, Both the intercostal Nerves end in small Fibres, which
Fibres

Fibres are distributed into the very Sphincter of the *Anus*.

t, A Nerve from the 24th vertebral Pair, which is carried into the inguinal Glandules.

VVV, Shoots sent down from the intercostal Nerve on both sides into the Body of the Ureters.

X, A Nerve which goes to the Testicles and the *cremaster* Muscle cut off where it goes out of the *Abdomen*.

FIG. II.

The Spinal Artery that lyes on the fore-part of the *Medulla Oblongata* within the Bony *Specus* of the *Vertebra* running along from the *Occiput* to the *Os Sacrum* like Net-work.

aaa, Arterial Shoots from the vertebral Artery ascending between the holes of the Spinal Processes, sent down towards the Spine.

bbb, Arterial Branches sent down from the *Aorta* towards the Spine.

ccc, &c. An arterial Shoot reaching out of every aforesaid Branch into the Spinal Marrow.

ddd, &c. Other Shoots from each of the aforesaid Branches, passing to the fore-part of the Spinal Marrow.

eee, The aforesaid Arterial Branches, which as soon as they are carried to the bony Den, pre-

sently become forked, and send forth little Branches into either part, which on both sides communicate with the next Branch of the same side, and by the cross Process with the fellow Branch of the other side.

fff, The joining together of the Arteries of either side by the cross Branch.

gg, Arterial Branches going out of the *Os Sacrum*.

hh, Arterial Branches going to the *Meninges* of the hinder part of the Head.

ii, Arterial Branches going out of the Skull with the Nerves of the seventh Pair.

kk, Shoots reaching out into the wonderful Net, which in their Progress are inosculated mutually among themselves, and at length with the Carotid Arteries.

FIG. III.

Part of the Pulmonick Nerve view'd with a Microscope, to shew its Branchings on the Lobules of the Lungs.

A, The chief Trunk.

bb, The *Fibrilla* cut off and display'd, which pass to the little Lobes of the Lungs.

ccc, The small Stems of Nerves continued from each *Fasciculus* of nervous Fibres, from whence others are propagated to the next little Lobe.

T A B. XVII.

The 5th, 6th and 8th from Casserius, the rest from Bidloo.

FIG. I.

THE External parts of the Eye.

A, The Eye-brow B the upper Eye-lid, C the lower, D the internal Angle of the Eye, in which, part of the *Glandula Lacrymalis* is seen. E, The external Angle, F the Hairs of the upper, and G the lower Eye-lid.

FIG. II.

A, The Skin with the *Musculus* or *Arbicularis Palpebrarum* remov'd.

B, The Bone of the upper part of the Orbit bored.

C, The great Lachrymal Gland, *in situ*.

D, A faint appearance of the excretory Ducts of the Lachrymal Gland. See the following Figure.

E, Divers little Glands interspers'd with the Ducts.

FIG. III.

The Lachrymal Glands within the Orbit of the Eye represented somewhat bigger than the Life.

AA, The upper part of the Bones of the Orbit.

BC, &c. The superior Lachrymal Gland.

DD, Its excretory Ducts first observ'd by *Meibomius*, and call'd *Hygrophthalmicos*, by *Borricinus* and by *Segerus Hygro Clepharicos*, because they discharge themselves of their Lymphic Humour within the Orbit and *Palpebra*.

EE, Divers little Glands dispersed between the last mention'd Ducts.

FG, The Cartilaginous Rim of the Eye-lids connected with Membranes.

HHH, The Hairs of the upper Eye-lid turn'd somewhat upwards, which by the Microscope appear to have lateral Fibres.

I, The Lachrymal Gland placed in the internal Angle of the Eye.

KK, The little Bones of the Nose broke off to shew the following Ducts

M, L, which convey the superfluous Moisture of the Lachrymal Ducts into the Nostril of the same side.

FIG. IV.

The Muscles of the Eyes, &c.

A, The *Musculus Rectus oculi attollens*.

aaa, The Motary Nerves of the Eye.

B, The *Deprimens*.

C, The *Adducens*.

D, The *Obliquus inferior*.

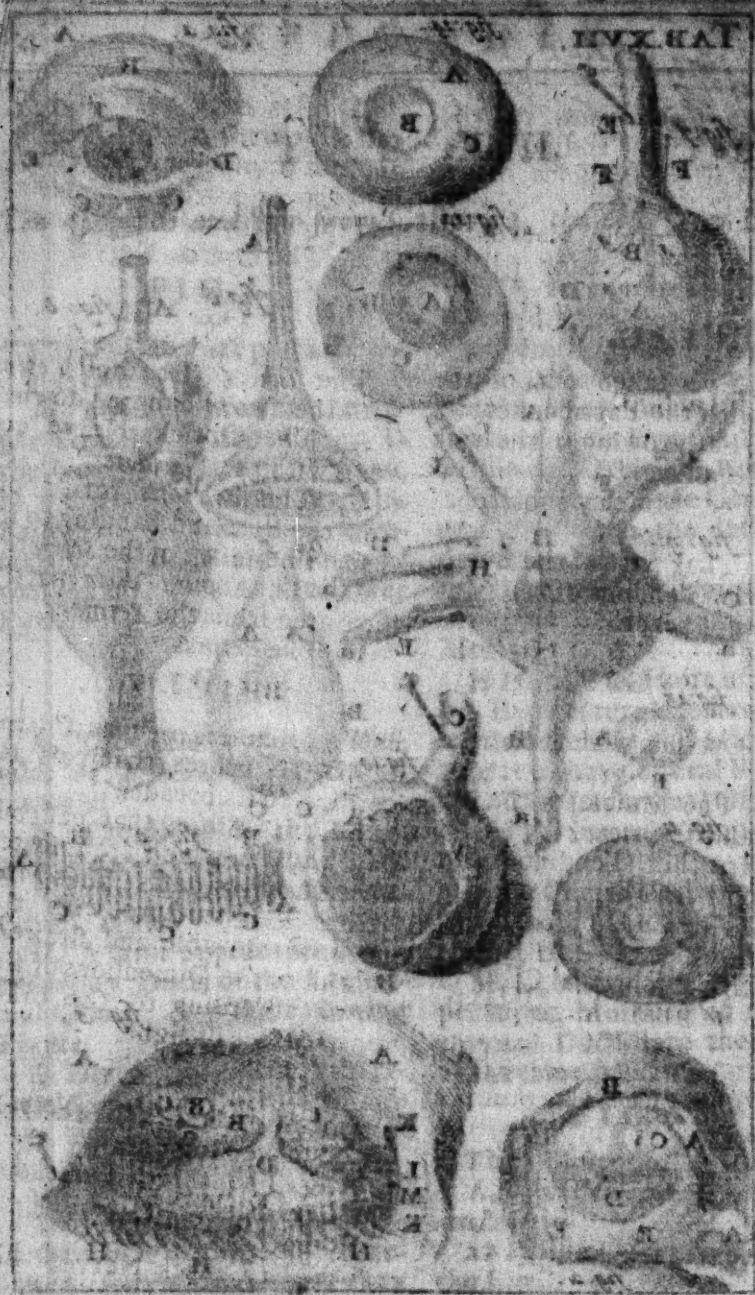
E, The *Abducens*.

F, The *Obliquus superior*.

G, The

TAB. XVII.





A. The Cornea
 B. The Iris
 C. The Crystalline Lens
 D. The Vitreous Humour
 E. The Retina
 F. The Optic Nerve
 G. The Sclerotic Coat
 H. The Choroid Coat
 I. The Ciliary Muscles
 K. The Lacrymal Gland
 L. The Lacrymal Duct
 M. The Lacrymal Sac

p
E
p
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O
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Co

G, The *Cartilaginous Trochlea*.

HHH, The Tendinous Expansions of the Muscles of the Eye.

I, The Optick Nerve implanted into the back part of the Eye.

FIG. V.

The Eye taken out of the Orbit with the Fat about it.

AA, Fat growing to the back part of the Eye.

B, The Muscles not separated.

CC, That part of the Eye to which the Tendons of the Muscles do not reach.

FIG. VI.

The Eye-lids with their Muscles.

AA, The Muscle of the *Palpebra* call'd *Levator*.

B, Its thin Tendinous Expansion at its Termination.

CC, The *Tarsi*, or Cartilages of the Eye-lids.

D, The Lachrymal Caruncle in the internal Angle of the Eye.

dd, The *Puncta Lachrymalia*.

E, The outward corner of the Eye.

FIG. VII.

The external Tunicks of the Eye.

A, The *Tunica Adnata*.

B, The *Cornea*.

C, Its fore-part which is transparent, and properly call'd *Cornea*.

D, Its back part properly call'd *Sclerotis*, which is thick and not transparent: Externally it is cover'd with the *Adnata*, and internally with the *Uvea*.

E, The Optick Nerve.

FIG. VIII.

The *Tunica Uvea* and *Retina* with the *Cornea* hanging down.

A, The Optick Nerve cover'd with the *Pia Mater*.

B, The *Sclerotis* turn'd off from the *Uvea* and hanging to it.

C, The inside of the *Sclerotis*.

D, The *Tunica Uvea* partly separated from the *Retina*.

E, The *Retina*.

FIG. IX.

AA, The *Ligamentum Ciliare*.

BB, Its Fibres that pass according to its breadth,

CC, Its Fibres that pass but half way: in which are inserted divers Lymphæducts: This Musculous Constructure with the *Uvea*, is movable and straitens or widens the Dimensions of the *Pupilla* according to the different degrees of light.

FIG. X.

The Membranes of the Eye without the Humours.

AA, The three Tunicks of the Eye together.

B, Part of the *Pupilla*.

C, The Optick Nerve.

FIG. XI & XII.

The Vitreous and Chrysalin Humours taken out together.

c 2

A, Chry.

A, The Chryſtallin Humour.
 B, Parts of the Fibres of the
 Ciliar Ligament broken off and
 remaining on
 C, The Vitreous Humour.

FIG. XIII.

A, The Chryſtallin Humour
 taken out.

B, A Membrane rais'd from
 the Chryſtallin Humour.

FIG. XIV.

AC, The *Vitreous Humour*.
 B, A Cavity in this Humour,
 in which the back part of the
 Chryſtallin is receiv'd.

T A B. XVIII.

FIG. I, II, III, IV & V. from A. Lewenhoeck, the VIth
 from Henr. Meibomius. *The Five first ſhews the Chry-
 ſtallin Humour of the Eye variously view'd with a Micro-
 ſcope. See the Philosophical Transactions Numb. 165.
 in the Year 1684, for the Month of November.*

FIG. I.

ABC THE Chryſtallin Hu-
 mour of its natural
 ſize.

B, That part of it next the
Tunica Cornea.

FIG. II.

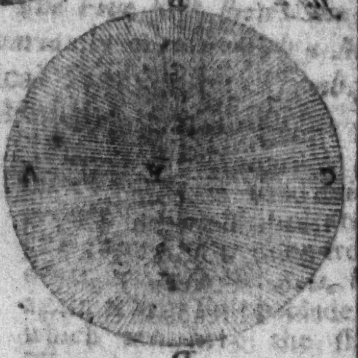
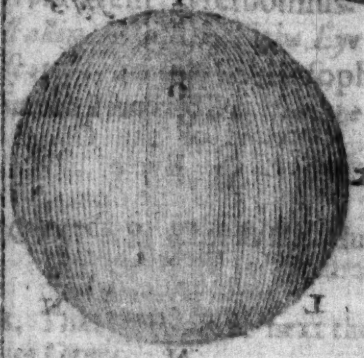
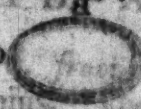
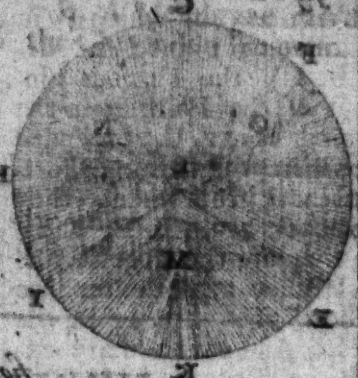
The Threads conſtituting
 the Scales wonderfully diſpoſed.
 From the Center L, the Threads
 paſs three ſeveral ways, not that
 all the Threads paſs to the Center,
 for example, the ſhortest MK.
 HN. QF. don't come ſo far, but
 reach to the *Axis* of the other
 ſide as the Threads ELK do
 here. They return from thence
 back, and are in this Section the
 ſhortest Threads HN. Theſe
 Threads HN are placed on the

other ſide near the *Axis*, and
 returning back again, are then
 OF; and OF coming from the
 other ſide nigh the *Axis*, is here
 again KM. To conclude, thoſe
 which are here the ſhortest
 Threads, are on the other ſide
 the longeſt, and *Vice verſa*. To
 preſent this clear to view, I
 have drawn with Lines the
 Threads compaſſing one of the
 Scales of the Chryſtallin Body
 ſeen on one ſide. See

FIG. III.

RTPSWQ. Tho' it ought
 to be a flattish round, I have
 here made it Globular, conſi-
 dering, that in this Repreſen-
 tation the Thread conſtituting
 each Scale may be the better
 diſcerned. P and Q are the middle
 Points

PLATE XVIII



Points or *Axis*, of which P (in the foregoing Figure 2, denoted by L) the Threads issuing out of the Point P, in the foregoing Fig. 2. L, extended to V, where they are the shortest Threads; from whence they extend back again to P, where again they are the largest; and from P they again extend to W where they are again the shortest: And thus also are extended the Threads from T to Q, and thence again to X, and from X to Q, and thus half the Course of every one of the Threads is demonstrated, since we must suppose this for an half round. In short the Threads LI in Fig. 2. are here PS, and the Threads between L and M of that Figure, are here the Threads between P and X, and the Threads between LO in the foregoing Fig. 2. are here the Threads between P and T. So that the Threads in the foregoing Fig. 2. between FOLIKE are here in Fig. 3. the same with RTPS. Here is further to be observ'd, that the Threads constituting the Chrystallin Body, are thickest about R and S, and the nearer they approach to P or Q, they are the thinner. To conclude, when we view the foresaid Chrystallin Body with attention, as it cometh fresh out of the Eye, we find it to excel in transparency the purest Glas, notwithstanding it is compos'd of so many thousand Threads, where they lye so very close together, that one would wonder how the light

can pass through them in right Lines, which is absolutely necessary; for if it were otherwise, the Chrystallin Body would appear white but not transparent.

FIG. IV & V.

The same Agreement (says *Lewenboeck*) I found also in the Eyes of Hares and Rabbits, except that whereas the Threads constituting the beforementioned Chrystallin Bodies, spread themselves from the Center in three distant Courses; here the Threads of each Scale spread themselves, but in two courses. Fig. 4. ABCD representeth half the round of the Chrystallin Body of the Eye of a Hare or Rabbit, E is the Center, which lyeth extended to the Apple of the Eye; these Threads constituting each Scale, which run as through the Center E, are on the other side the shortest, and appear like unto F or G; likewise F and G, on the other side run through the Center. I have also caused the foregoing Figure to be drawn sidewise, the better to represent the thread-like appearance of each Scale. I suppose then that the Threads, which in Fig. 4, are represented between E and F, are the same with those in Fig. 5. represented by IO. So that the Threads which come from the Point I (the same with E in the former Figure) end here in N and L, where they are the shortest; and those which extend to O, through

through or close to the *Center M*, where they are the longest, end there, or bend again on the other side, as the same do here. In short, those which here approach the *Center I*, are on the other side farthest from the *Center*.

FIG. VI.

The Lachrymal Duct passing towards the Nostril.

a a, The Continuation of the Lachrymal Duct from the *Puncta Lachrymalia* to the extremity of the Nostril,

b b, The Excretory Duct that is proper to the Nostrils.

T A B. XIX.

From *M. Du Verney*.

FIG. I.

THE Ear in its natural Situation, together with the Arteries which are distributed to its fore-part.

ABCD, The Ear ABC its three *Plica*, D the *Auricula*, E the *Concha*, at

F, near E is to be seen the *Foramen* of the *Meatus Auditorius*, F, The place of the *Tympanum*, or rather *Membrana Tympani*, the two prick'd Lines shew the length of the *Meatus*.

GG, Part of the *Os Squamosum* bored.

H, The *Musculus Attollens Auriculam* (or first Muscle) lying on the *Os Squamosum* after the Temporal Muscle is taken away.

I, Part of the *Os Fugale*.

K, The *Processus Styloides*.

L, The external Carotid Artery cut off about the Angle of the lower Jaw-bone.

M, The Branch which ascends by the fore-part of the Ear.

N, Those that pass on the back part of the Ear.

P, A Branch that goes to the Ear it self.

O, Another Branch which passes to its Cartilage, and internal part of its *Concha*.

FIG. II.

The Ear drawn forward to shew its second Muscle, with the several Teguments of the Ear, and the Arteries which lye behind it.

A, The Ear turn'd forward.

B, Its second Muscle call'd *Retrabens Auriculam*, whose Fibres are here bared from their Membranes to shew their Progress.

C, The Cartilage laid bare, to shew the Insertion of the Muscle.

D, The true Skin of the Ear, under which the Fat is placed.

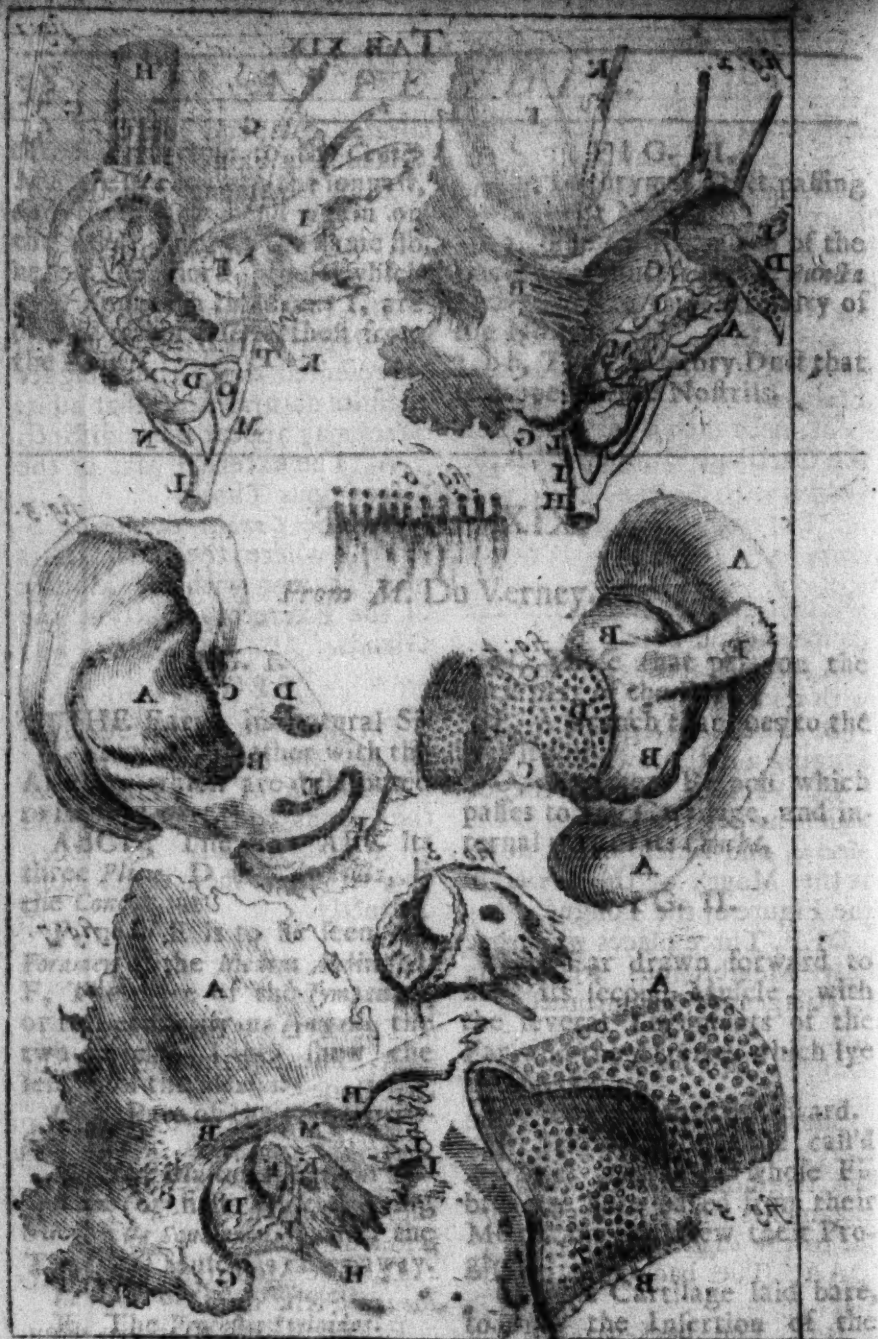
E, The *Membrana Nervosa*, according to *Du Verney*.

F, Part

TAB XIX.



The Appendix of the ...
 The upper part of the ...



The External Carotid
Artery cut off about the Angle
of the lower Jaw-bone.
The Branch which al-
ways by the fore-part of the Ear.

The true Skin of the Ear,
under which the Fat is placed.

The Membrana, &c. &c.
according to Du Verney.

F, Part

F, Part of the *Os Squammosum*.

G, The Mammillary Procefs.

H, The Trunk of the Carotid Artery.

IK, Its Trunk, which as it ascends behind the Ear, sends divers Shoots to it.

L, A Branch that is bestow'd on the Cavities of the Mastoid Procefs.

M, A Branch after passing on the Cartilage is dispers'd on the *Concha*.

FIG. III.

The Cartilage of the Ear and its *Meatus* laid bare.

A, The Cartilage of the Ear with its Foldings.

B, The Cartilaginous *Meatus* hanging a little down.

C, Part of the Cartilage, which makes the Orifice of the *Meatus*, and which hangs down at the Mouth of the *Concha* in the Figure of the Tongue.

DEF, Three places which are only Membranous where the Cartilages are discontinued.

FIG. IV.

Shews the back-part of the Ear, and the upper part of the Cartilaginous *Meatus*, with the Ligaments which joyn the *Concha* to the *Os Temporum*.

AA, The back-part of the Ear.

BB, The back-part of the *Concha* bared.

CC, The Appendices of the Cartilaginous *Meatus*.

D, The upper part of the

Meatus compos'd only of the Glandulous Skin.

E, A Ligament of the Ear.

FIG. V.

The Glandulous Tunick that invests the Cartilaginous *Meatus* represented three times bigger than its natural size, that all its parts may appear more distinct.

A, The external part of the Glandulous Tunick.

B, The *Canalis* or *Meatus* open'd, where the small Hairs may be seen with the Mouths of the Excretory Ducts of the Glands.

FIG. VI.

Part of the *Meatus* cut so as to shew the thickness of it, and the manner of the Adhesion of the Glands to that Skin; Some of which Glands are taken out, to shew their *Loculi* more distinctly.

FIG. VII.

The Temple Bone bared.

A, The Squamous part of this Bone.

BB, Part of the *Os jugale* or *Apophysis Zygomatica*.

C, A small Depressure where the Ligament of the Ear is fasten'd.

D, The Mouth of the bony *Meatus* of the Ear.

E, The Cliffs that are seen in the fore-part of this Bone next the *Fauces*.

F, The Membrane of the *Tympanum* in its proper Situation.

G. The

G, The Mammillary Process.
H, The Styloide Process.
I, The *Canalis* in which the internal *Carotid* passes.

K, A *Sinus* between the bony *Meatus* and Squamous part of the *Os Temporum*, by which the Muscle of the *Malleus* passes into the *Tympanum* it self.

L, The Extremity of the bony *Meatus*, which is part of the Channel leading from the Ear to the Palat.

FIG. VIII.

The Bony *Meatus* separated from the Temple Bone.

T A B. XX.

From M. Du Verney.

FIG. I.

THE Temple Bone after its Squamous part with the external *Meatus* is cut away to shew the Membrane of the *Tympanum*.

A, The Membrane of the *Tympanum* in its proper place, so that it may be readily seen.

B, The handle of the *Hammer* cleaving to the inside of this Membrane.

C, The longest Process of the *Incus*, which may be seen through the Membrane of the *Tympanum*, tho' it is placed at some distance behind it.

D, The head of the *Hammer* or *Malleus*.

E, The thick part of the *Incus* with

F, Its short Process, which appears bared in this Section.

G, The Bony *Meatus* broke off in its middle.

H, The Mastoide *Apophysis*.

I, The Styloid.

K, The external Muscle of the *Malleus* in its place.

L.....The small slender and long Process of the *Malleus*, to which the Muscle is inserted.

FIG. II.

The *Membrana Tympani* taken out and view'd laterally.

FIG. III.

The Membrane of the *Tympanum* view'd after the same manner, but still remaining in the Extremity of the Bony passage.

AA, The side of the Bony *Meatus* next the Face, by which the gradual ascending Progress of that passage may be understood as it leads to the *Membrana Tympani*.

FIG. IV.

The lateral View of the *Incus* and *Stapes* in their proper Situation,

A, The





G. The Bony Structure of the Ear
 as in its middle.
 H. The Malleus, Incus, and Stirrup.
 I. The Styloid.

The internal View of the Ear
 and Ossicles in their proper Situa-
 tion.

A. The

A, The thickest part of the *Incus*.

B, The short Branch of the *Incus*, which in this view appears on

C, The long Branch.

D, The head of the *Stapes*, which is joyn'd with the long Process of the *Incus* by the mediation of the fourth Bone.

FIG. V.

N. B. That these following Figures, by mistake of the Graver, are placed in different parts of this Table, and are done four times bigger than the Life.

A, The Beak of the longest Branch of the *Incus*.

B, The *Officulum quartum*.

C, The head of the *Stapes*, in whose Cavity (here express'd) the *Officulum quartum* is receiv'd.

FIG. VI.

The *Stapes* four times bigger than the Life.

A, Its Head.

B, Its Neck.

CG, Its Sides.

D, Its *Basis*.

E, The Membrane of the *Stapes*.

FIG. VII.

D, The *Basis* of the *Stapes*.

FIG. VIII.

A, The *Stapes*.

B, Its Muscle, both being represented more than twice as big as the Life.

FIG. IX.

Shews the small Bones of the Ear, as they appear if you view them from that *Meatus* which opens into the *Mastoid Process*.

A, The thickest part of the *Incus*.

B, Its short Process *fore-shorten'd*, the Eye being directly against its Point.

C, Its longest Branch.

D, The back part of the handle of the *Malleus*.

E, The *Stapes* seen from above.

FIG. X.

Another view of the Bones of the Ear (on the opposite side) from the *Meatus*, which leads from the Palat to the *Tympanum*.

A, The head of the *Malleus* covering the thicker part of the *Incus*, and its short Process.

B, The handle of the *Malleus*.

C, The longer Branch of the *Incus*.

D, The *Stapes* view'd laterally.

N. B. That the Line or rather *Stylus*, express'd in these two last Figures, shews the parts of these Bones that appear above or underneath in their different Views.

FIG. XI.

Represents almost the same parts that are express'd in Fig. 1. of this Table, all being drawn much bigger than in the *Skeleton*. The Membrane of the *Tympanum* being here taken away to shew the Bones in their proper

per Situation, and the parts that appear in the inside of the *Tympanum* it self.

A, The *Malleus*.

B, The *Incus*.

C, The *Stapes* directly under the Eye, so that its Head is hid by the *Rostrum* of the longer Branch of the *Incus*, tho' its *Basis* may in this view somewhat appear as it covers the *Fenestra Ovalis*.

D, The bottom or lower part of the *Tympanum*, which is the Surface of the *Os Petrosum*.

E, The *Fenestra Ovalis*.

FG... Half of the *Meatus* in which the internal Muscle of the *Malleus* is inclosed.

F, That part of this divided *Meatus* that is without the *Tympanum*.

G, Its other part within the *Tympanum*.

HI, The bony part of the *Meatus*, which leads from the Palat to the Ear, divided through its middle to shew its Cavity.

I, The Extremity of the *Meatus*, in which the *Musculus Stapedis* is inclosed.

FIG. XII.

The *Incus* view'd on that side where it is articulated to the *Malleus*.

A, The great end of the *Incus*.

B, Its short Branch Fore-shorten'd.

C, Its long Branch.

D, Its first Cavity.

E, The Second—

F, A Protuberance arising between these two Cavities.

FIG. XIII.

That part of the *Malleus* is here chiefly represented which is articulated with the *Incus*.

A, Its Head.

B, Its Handle.

C, Its large *Apophysis*.

D, Its first Protuberance, which is receiv'd in the Cavity of the *Incus* D, in the preceeding Figure.

E, Its second Protuberance which is receiv'd at E in the same Figure.

F, The Cavity which receives the Protuberance F, Fig. ib.

FIG. XIV.

The *Malleus* as it appears when view'd, from the *Aquæduct*, that the Inflection of the Muscles may be seen, especially the internal Muscles which pass into the *Tympanum* to its insertion on the *Malleus*.

AB, The *Malleus*.

C, The exterior Muscle.

D, The interior—

FIG. XV.

Shews the Circumference of the *Tympanum* and the *Malleus* view'd from the inside with its Muscles in its proper Situation.

A, The Head of the *Malleus*.

B, Its Handle—

C, The external Muscle of the *Malleus*.

D, Its Insertion.

E, The internal Muscle of the *Malleus*.

F, The

F, The place which it goes to, and makes an obtuse Angle, and whence it is inflected to the Handle of the *Malleus*, to which it is inserted under the external Muscle.

GH, The Circumference of the *Tympanum*.

I, The great *Apophysis* of the *Malleus* fore-shorten'd.

K, The lesser *Apophysis* to which the external Muscle is inserted.

LM, The Nervous Covering of the internal Muscle somewhat open'd to shew that Muscle.

That it may be better conceiv'd how these two Muscles move the *Malleus*, and thereby stretch the Membrane of the *Tympanum* or relax it, their Insertions do shew, that when the external Muscle CD Acts only, the Extremity of the *Manubrium* B (or handle) is drawn outward, because the head of the *Malleus* G is fasten'd in the *Tympanum*. But it both these Muscles move together, the Extremity of the *Malleus* (being drawn inwardly by the internal Muscle EF,) stretches the *Membrana Tympani*. For the external Muscle CD draws or at least tyes up the Head of the *Malleus*, which does not bear upon the *Tympanum* in H as it does in G.

FIG. XVI.

Shews the back part of the *Oss Temporis* as big again as the

Life, its Squamous part being here taken away, and the Bone cut through from the top to the bottom (according to the *Stria*) so that the Incision passeth through the middle of the Mastoid Process: This Section is so made, that the *Stria* about the *Membrana Tympani* appears, as does also the place where the *Stria* is wanting. Here also may be seen the *Parietes* of the Bony *Meatus* next the Face looking downwards, and covering a part of the *Membrana Tympani*; and finally all the Sinuosities of the Mastoid Process are laid open.

AA, The *Stria*.

a a, The space in which the *Stria* is wanting.

B, The side of the Bony *Meatus* next the Face, in this view, lying downwards.

C, The *Malleus*.

D, The small Cord of the *Tympanum* drawn inwards, that it may be seen how it passes on the external Muscle.

b, c, A Sinuosity in the Bone on the *Stria*, which gives the Muscle the Benefit of a Pulley.

E, The external Muscle of the *Malleus* in like manner drawn inward.

FF, The bony part of the *Meatus* that leads to the Palar.

G, The *Meatus* to the Mastoid Process.

HHH, The Sinuosities of that *Apophysis*.

T A B. XXI.

From M. Du Verney.

FIG. I.

Shews the *Os Temporis* not exceeding its just Maghitude, and so prepar'd, that the *Stapes* may be seen in its proper place, together with the *Meatus* which goes from the Ear to the Palat.

A, The *Stapes* in its proper Situation.

BC, Part of the *Bony Canal*.

D, The Cartilaginous part of the same *Canal*, which is thick and large at its Extremity.

E, The inside of the Membrane that invests the inside of the Channel hanging down.

FIG. II.

Another View of the same Temple-bone exceeding its natural size, and so prepar'd, that the *Coclea* and semicircular Channels appear in their natural Situation.

A, The Arched Roof of the *Vestibulum*.

B, The *Fenestra Ovalis* as it appears when the *Stapes* and Membrane that connects it are remov'd.

CDE, The three semicircular Channels in their proper Sight, C the superior, D the middlemost, E the lowermost. The middlemost and lowermost in this Figure are open'd to shew their Cavities.

FIG. III.

Shews the top of the *Coclea* taken off to its internal part, that the Semioval Spiral Channel may be seen.

FIG. IV.

Shews the *Spiral Lamina* suspended as it were in the Air much bigger than the Life, with the Membrane which fastens it to the Superficies of the Channel.

a, b, c, The *Lamina Spiralis*.

d, e, f, The Membrane which adheres to it.

FIG. V.

Shews the Center or Body of the *Coclea* much bigger than its natural size, in which some marks of the turnings of the *Spiral Lamina* and the Channels may be seen.

a, b, c, The *Vestigia* of the Turnings of the *Spiral Lamina* full of many little holes which afford passages of the Filaments of the *Auditory Nerve*.

d, e, f, Marks of the Extremities of the *Spiral Channel*.

FIG. VI.

Shews the *Vestibulum* and the three Semicircular Channels open'd, that the distribution

TAB. XXI





of the Vessels may be seen in them.

a, The Branch of an Artery which enters the *Vestibulum*.

b, Another Branch of the same Artery which enters by the common hole of the *Vestibulum*, and is distributed to the superior and inferior Channels.

c, The Branch that goes to the inside of the middle Channel.

FIG. VII.

Shews the back part of the *Os Petrosum* very much magnified, the Bone it self being rasped away, so much as is needful, to shew the Semicircular Convolutions and Cavity in which the Auditory Nerve ends.

A, The hole of the Auditory Nerve rasped.

BB, The Semicircular Ducts.

C, The *Basis* of the Body of the *Cochlea* with divers small holes in it, which afford passages to the Nervous *Fibrillæ* that are spread in all the Spiral turnings and windings.

D, The beginning of the *Meatus* by which part of the hard Nerve passes.

E, The hole by which a Branch of the soft Nerve passes, Fig. 8. E.

F, Another hole by which a third Branch of the soft Pair passes, express'd Fig. 8. F.

FIG. VIII.

The Auditory Nerve magnified and freed from the *Os Petrosum*, that it may appear how this Nerve is divided within the *Meatus* of that Bone.

A, The Auditory Nerve divided into two Branches.

BB, Part of the soft Nerve.

CC, Part of that hard Nerve whose upper part is so express'd in this Figure, that the *Fibrillæ* and Branches of the portion of soft Nerves may be seen. The Trunk of this Portion of the hard Nerve, is inserted in the *Foramen* mark'd D in Fig. 7.

D, The great Branch of the soft Nerve divided into divers *Fibrillæ*, which inter into divers holes at the *Basis* of the Body of the *Cochlea*, and are distributed into all its Spiral Turnings and Windings.

E, Another Branch of the soft Nerve, which enters by the *Foramen* mark'd E in Fig. 7.

F, The third Branch of the soft Nerve, which enters at the *Foramen* F of Fig. 7.

T A B. XXII.

From M. Du Verney.

FIG. I.

S Hews the upper part of the Temple-bone inclining a little, together with the Branch of the fifth Pair of Nerves, which is distributed into the left Cheek, and the Origin of divers of the Filaments which is called the *Corda Tympani*, as also the divisions of the other Branch of the same Nerve which goes to the outward part of the Ear.

A, Part of the Squamous Bone of the Temples.

B, The Mastoid Process.

C, The Styloid Process.

D, The Zygomatic Process.

E, The Meatus that goes from the Ear to the Palat.

F, A Branch of the fifth Pair, chiefly distributed into the lower Cheek, and into the parts that joyn to it.

g h i k, Four Shoots from this Branch as soon as it comes out of the Cranium.

g, The first goes to the temporal Muscle.

h, The second to the external Masseter.

i, The third goes to the Muscle call'd the *Buccinator* and Glands of the Cheeks.

k, The fourth goes to the *Musculus Pterygoideus internus*.

C, Another Shoot which is sent out from this Branch.

H, A part of this Branch,

which is joyn'd with the hard Branch of the Auditory Nerve.

I, The distribution of the Branch G into the outward part of the Ear, whose outward Branches are cut off.

K, A Branch, which being cut off, goes into the lower Jaw.

LL, A Branch which goes to the side of the Tongue.

MM, A Branch going from thence, and ascending backward over the bony part of the Meatus of the Aquæduct, and goes into the Tympanum, and is that which is commonly call'd the *Corda Tympani*.

N, The external Muscle of the Malleus in its proper place.

FIG. II.

A, The Processus Mastoïdes.

B, The hinder part of the Ear seen.

C, The Trunk of the second vertebral Pair.

a b c d e f g, Many Branches cut off, which the last mention'd Trunk sends to the neighbouring Muscles and vertebral Nerves.

DD, A Branch of the same Nerve, which passes by the back part of the Ear.

E, A Branch which ends in the Auricula, and in the Cartilaginous Meatus.

FIG.



T A B. XXII.

From M. Du Verney.

FIG. I.

Shews the upper part of the Temple-bone inclining a little, together with the Branch of the fifth Pair of Nerves, which is distributed into the left Cheek, and the Origin of divers of the Filaments which is called the *Corda Tympani*, as also the divisions of the other Branch of the same Nerve which goes to the outward part of the Ear.

A, Part of the Squamous Bone of the Temples.

B, The *Mastoid Process*.

C, The *Sylloid Process*.

D, The *Zygomatick Process*.

E, The *Meatus* that goes from the Ear to the Palat.

F, A Branch of the fifth Pair, chiefly distributed into the lower Cheek, and into the parts that joyn to it.

g h i k, Four Shoots from this Branch as soon as it comes out of the *Cranium*.

g, The first goes to the temporal Muscle.

h, The second to the external *Masseter*.

i, The third goes to the Muscle call'd the *Buccinator* and Glands of the Cheeks.

k, The fourth goes to the *Musculus Pterygoideus internus*.

C, Another Shoot which is sent out from this Branch.

H, A part of this Branch,

which is joyn'd with the hard Branch of the Auditory Nerve.

I, The distribution of the Branch G into the outward part of the Ear, whose outward Branches are cut off.

K, A Branch, which being cut off, goes into the lower Jaw.

LL, A Branch which goes to the side of the Tongue.

MM, A Branch going from thence, and ascending backward over the bony part of the *Meatus* of the *Aquæduct*, and goes into the *Tympanum*, and is that which is commonly call'd the *Corda Tympani*.

N, The external Muscle of the *Malleus* in its proper place.

FIG. II.

A, The *Processus Mastoïdes*.

B, The hinder part of the Ear seen.

C, The Trunk of the second vertebral Pair.

a b c d e f g, Many Branches cut off, which the last mention'd Trunk sends to the neighbouring Muscles and vertebral Nerves.

DD, A Branch of the same Nerve, which passes by the back part of the Ear.

E, A Branch which ends in the *Auricula*, and in the *Cartilaginous Meatus*.

FIG.





FIG. III.

Shews the Ear of a Child of a Year old.

A, The under part of the Ear.

BB, Its Channel or Cartilaginous *Meatus*.

C, The Membrane that joyns the Cartilaginous *Meatus* to the bony *Annulus*, which in time grows hard, and chiefly makes up the bony *Meatus* of the Ear.

D, The bony *Annulus*.

E, The Process of the *Os Fugale*.

FIG. IV.

Shews the fore-part of the temporal Bone of an *Embryo*.

A, Its Squamous part, whose little bony Fibres appear, as it is seen in some other Bones in the Skull of an *Embryo*.

a b, The Margin of its Circumference as yet Cartilaginous.

B, Part of the *Os Fugale*.

C, The Membrane of the *Tympanum*.

D, The bony *Annulus* with which the Membrane of the *Tympanum* is joyn'd.

E, The *Processus Styloides* as yet Cartilaginous.

FF, The *Processus Mastoides* very small.

d, The *Foramen*, through which the hard Branch of the Auditory Nerve passes out.

G, The conjunction of the Squamous part of the Temple bone with the Mastoid-bone, united in an Adult.

H, The Channel in which that Carotid Artery passes.

I, The *Foramen* that goes from the Palat to the Mouth.

FIG. V.

Shews the hinder part of the Temple-bone.

A, The Squamous part.

BB, The place where it is separated from the rest of the *Os Petrosum*.

C, The superior semicircular Channel unprepared.

D, The inferior—

E, The place where both Channels meet.

F, A remarkable Hollow which lies under the superior Channel, and which in time is filled up and is not perceivable.

G, The *Foramen* for the passing of the hard Nerve.

H. The *Foramen* of the Auditory Nerve.

FIG. VI.

Shews the bony *Annulus* a little stooping that the *Stria* may be seen.

FIG. VII.

Shews the same *Annulus*, but otherwise inclin'd, that the rest of the *Stria* may be visible.

FIG. VIII.

This shews the hard Portion of the Auditory Nerve on different parts of the Face.

A, The Trunk of the hard part of the Auditory Nerve coming out of the *Cranium* through the *Foramen* that is between the *Processus Mastoides* and *Styloides*.

BB, A

BB, A great Branch which is sent from that Trunk to the Ear, whose small Filaments are seen cut off.

CC, The inferior Branch which is dispersed to the Chin, Muscles and Teguments that lye under the lower Jaw.

a, The superior Branch that is divided in a three-fold manner.

D b c d e, Five Branches of this Division sent into the Muscles of the Temples, Forehead and Eye-lids.

f, A Branch of this Division which goes into the middle of the Cheek, through the Branch of the fifth Pair (mark'd g) and becomes bigger.

h, The last Branch of this Division, that sends Filaments to the *Musculus Buccinator* and Muscles of the Lips.

i i, Two small Filaments which seem cut off, because they pass into the *Orbita* of the Eye through their proper *Foramina*, which are in the first Bone of the upper Jaw.

T A B. XXIII.

FIG. I, II, V, VI, VII & VIII from Vellingius. The III^d from Schneider. FIG. IV from Casserius. The rest from Malpighius.

FIG. I.

A, THE Paury Scalp separated.

BB, The *Panniculus Carnosus*, by some call'd *Pericranium*, also separated.

C, The *Periostrum*, by some not distinguish'd from the *Pericranium*, here separated.

DD, The Skull bared.

E, The *Musculus Frontis*.

FF, The *Orbicularis*, or *Clausor Palpebrarum*.

G, The first Muscle of the *Ala Nasi*, call'd *Pyramidalis*.

H, The *Mus. Dilator Ala Nasi*.

I, A fictitious Muscle call'd by Authors *Mus. Dilatans Alas*, or *Circularis Nasi*.

K, *Mus. Attollens Labiorum*.

L, *Zygomaticus*.

M, *Depressor Labiorum Communis*.

N, *Constrictor Labiorum*.

O, *Buccinator*.

PP, *Temporalis*.

Q, *Attollens Auriculam*.

R, *Retrabens Auriculam*.

S, *Masseter*.

T, *Digastricus* cut from its Original.

FIG. II.

AA, The Temporal Muscles freed from their Originals, and left at their Insertions a a, at the *Processus Coronæ* of the lower Jaw.

BB, The



That part of the ...
The ...
Internal ...



Ala costalis call'd *Pyramidalis*.
 BB, The *Mass. Inferior* Muscl.
 CC, A Musclous Muscle call'd
 by Authors *Mass. Digastricus* *Ala*,
 or *Chelatus* *Nas*.

AA, The Temporal Muscles
 freed from their Originals, and
 left at their Insertions at the
Proccus Cordeus of the lower
 Jaw.

BB, The

BB, The *Musculi Masseteres* separated.

CC, Parts of the *Digastrick* Muscles left at their Insertions to the lower Jaw.

D, The *Musculus Prerigoides internus* on both sides.

EE, The *Pterygoides internus* on both sides.

F, Part of the *Quadratus* separated.

FIG III.

That part of this Figure marked AAAA and B, is by no means intelligible either in this Copy, or in the Original of *Schneider*; C the Membrane as it invests the roof of the Mouth, D the *Foramen* of the *Os Occipitis*, by which the Spinal Marrow descends.

FIG. IV.

The back part of the *Larynx*, with its Muscles, &c.

AA, The *Os Hyoides*.

B, The Concave part of the *Epiglottis*.

CC, The hinder Concave part of the *Cartilago Thyroides*.

DD, The *Par Cricoarytenoides posticum*.

E, The Posterior Membranous part of the Wind-pipe.

F, The *Musculus Arytenoides*.

FIG. V & VI.

A, That part of the *Os Hyoides* call'd its *Basis*, Fig. 5. A Fig. 6. shews the internal concave part of its *Basis*.

BB, The Horns of the *Os Hyoides*.

CC, The Cartilaginous Appendages.

FIG. VII.

The *Uvula* with the *Amigdalæ* or *Tonsillæ*.

A, The *Gargareon* or *Uvula*.

bb, The external Pair of Muscles call'd *Pterygostaphilinus*.

CC, The internal Pair call'd *Sphænostaphilinus*.

D, That part of the Palate from which the *Uvula* is continued.

BB, The *Tonsilla*.

FIG. VIII.

1, 2, 3, 4, 5. The Tongue of a Quadruped divided into five parts.

A, Its *Apex* or Point.

B, Its middle.

C, Its *Basis*.

FIG. IX, X, XI, XII, XIII.

Portions of the divided Tongue, in which are shewn the strait course of its external Fibres, and the various Dispositions of its internal Fibres.

9, The top of the Tongue cut off Transversly.

AA, The carnos Fibres which pass according to the length of the Tongue, and inclose it on every side, by which the Tongue is drawn into the Mouth.

B, The fleshy Fibres that pass transversly, and serve to narrow the Tongue.

8

C, The

C, The Perpendicular Fibres which lessen it in its thickness.

D, The Membrane as yet covering the Tongue.

E, The carnos Fibres passing obliquely from the sides to the upper Surface of the Tongue.

F, The strait Fibres which are continued with the Muscles of the Tongue.

G, The Angular Fibres (according to *Malpighius*) which draw the Tongue inwards.

HH, The Fibres which depress the ridge of the Back.

I, A Branch of a Nerve, which ends in the *Papilla* of the Tongue.

LL, The streight Fibres, which compress the *Basis* of the Tongue, between which are some small Glands and Fat.

M, The *Basis* of the Tongue.

N, The lower side of the Tongue in this Section.

FIG. XIV.

The *Basis* of the Tongue cut Traverse.

FIG. XV.

A piece of the Tongue with a Branch of a Nerve, and three sorts of *Papilla*.

FIG. XVI.

The Horny *Papilla* with their two coverings.

FIG. XVII.

AA, One of the *Tonsilla*, commonly call'd the Almonds of the Ears.

BB, The two larger Sinusses of the *Tonsilla*.

CCC, The several little Orifices of Sinusses that open into the larger.

T A B. XXIV.

FIG. I from *Blasius*; II and V from *Steno*; III and IV from *Dr. Wharton*; VI and VII from *Lewenhoeck*; VIII and IX from *Caspar Bartholine*.

FIG. I.

A, THE *Parotid* Gland in its natural Situation.

B, Its *Salival* Duct which passes through the *Musculus Buccinator* into the Mouth.

C, A Probe in the *Salival* Duct.

FIG. II.

The *Salival* Ducts of a Calf.

aaa, The conglomerated Gland call'd *Parotis*.

bb, The *Parotid conglobate* Gland.

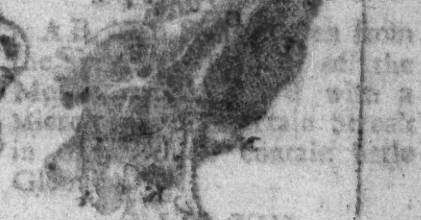
cc, The *Lymphæducts* tending downwards between the *Parotid*

PLATE V.



The parotid gland is situated near the ear, and its duct opens into the mouth near the lower molar teeth.

The sublingual gland is situated under the tongue, and its ducts open into the mouth near the lower incisor teeth.



The duct of the parotid gland is situated near the ear, and its duct opens into the mouth near the lower molar teeth.

The duct of the sublingual gland is situated under the tongue, and its ducts open into the mouth near the lower incisor teeth.

TAB XXIV.



A. THE Parotid Gland in its natural situation.
 B. The Salivary Duct which passes through the diaphragm of the Gland into the Mouth.
 C. A Probe in the Salivary Duct.
 D. The Salivary Ducts of a Cow.
 E. The Salivary Ducts of a Dog.
 F. The Salivary Ducts of a Horse.
 G. The Salivary Ducts of a Pig.
 H. The Salivary Ducts of a Sheep.
 I. The Salivary Ducts of a Goat.
 J. The Salivary Ducts of a Deer.
 K. The Salivary Ducts of a Stag.
 L. The Salivary Ducts of a Wild Boar.
 M. The Salivary Ducts of a Wild Cat.
 N. The Salivary Ducts of a Lynx.
 O. The Salivary Ducts of a Panther.
 P. The Salivary Ducts of a Tiger.
 Q. The Salivary Ducts of a Leopard.
 R. The Salivary Ducts of a Cheetah.
 S. The Salivary Ducts of a Puma.
 T. The Salivary Ducts of a Jaguar.
 U. The Salivary Ducts of a Bobcat.
 V. The Salivary Ducts of a Black Cat.
 W. The Salivary Ducts of a Siamese Cat.
 X. The Salivary Ducts of a Persian Cat.
 Y. The Salivary Ducts of a Turkish Cat.
 Z. The Salivary Ducts of a Chinese Cat.
 Aa. The Salivary Ducts of a Japanese Cat.
 Bb. The Salivary Ducts of a Russian Cat.
 Cc. The Salivary Ducts of a French Cat.
 Dd. The Salivary Ducts of an English Cat.
 Ee. The Salivary Ducts of a Scottish Cat.
 Ff. The Salivary Ducts of a Welsh Cat.
 Gg. The Salivary Ducts of a Breton Cat.
 Hh. The Salivary Ducts of a Norman Cat.
 Ii. The Salivary Ducts of a Picardy Cat.
 Jj. The Salivary Ducts of a Flanders Cat.
 Kk. The Salivary Ducts of a Brabant Cat.
 Ll. The Salivary Ducts of a Holland Cat.
 Mm. The Salivary Ducts of a Zeeland Cat.
 Nn. The Salivary Ducts of a Friesland Cat.
 Oo. The Salivary Ducts of a Groningen Cat.
 Pp. The Salivary Ducts of a Drenthe Cat.
 Qq. The Salivary Ducts of a Overijssel Cat.
 Rr. The Salivary Ducts of a Gelderland Cat.
 Ss. The Salivary Ducts of a Utrecht Cat.
 Tt. The Salivary Ducts of a Flevoland Cat.
 Uu. The Salivary Ducts of a Overijssel Cat.
 Vv. The Salivary Ducts of a Drenthe Cat.
 Ww. The Salivary Ducts of a Groningen Cat.
 Xx. The Salivary Ducts of a Friesland Cat.
 Yy. The Salivary Ducts of a Zeeland Cat.
 Zz. The Salivary Ducts of a Holland Cat.

Parotid Conglobate and Conglomerate Glands.

dd, The roots of the Salival Excretory Ducts.

e, The Trunk of the *Ductus Salivalis*.

f, The outward Branch of the Jugular Veins.

gg, The Nerves communicating as well without as within the Gland and Head.

ii, The Nervous Twigs accompanying the Salival Duct.

FIG. III & IV.

Shews the *inferior Maxillary Gland*, with its *Salival Ducts* in a Calves Head.

A, The back part of the *inferior Maxillary Salival Gland*.

aaaa, The posterior roots of the *Ductus Salivalis*.

B, The fore-part of the Gland.

bb, The anterior Roots of the same Ducts.

C, The Trunk of the Salival Ducts arising from the hinder Roots of the Salival Ducts aa, and marching over the Tendon of the *Digastrick Muscle*.

D, The other part of the *Salival Duct* on the other side of the Tendon where it joyns with the foremost Roots bb.

E, The Union of all these Ducts into one common Trunk.

FG, The *Musculus Digastricus* or *Biventer*.

H, The Progress of the Salival Duct towards the fore-teeth of the lower Jaw.

I, The opening of the *Ductus Salivalis* under the Tip of the Tongue near the *Dentes Incisores* of the lower Jaw.

K, A round Glandule placed by the Jaw.

L, The row of Asperities under the side of the Tongue.

M, The Tongue laid aside to shew the endings of the Salival Duct at I.

N, The *Tonsilla*.

FIG. V.

The Muscous Texture of the Tongue.

FIG. VI & VII.

AB, Two Scales taken from the internal Tunick of the Mouth, when view'd with a Microscope. A certain Streak in them which contain little Globules.

FIG. VIII.

The Salival Gland of the lower Jaw of a Lyonsess.

A, The Gland of the lower Jaw.

B, Its *Salival Duct*, discover'd by Dr. Wharton.

C, The *Glandula Sublingualis*.

D, Its *Salival Duct*, first discover'd by Cas. Bartholine; the various Ramifications of which, appear dispers'd through the whole Gland.

FIG. IX.

Shews the two Mouths of the inferior Salival Ducts on both sides, viz. that of Dr. Wharton and of C. Bartholine.

aa, Two Bristles or Wiers inserted into the Mouths of those Ducts on both sides.

b, The Tongue turn'd aside to shew the Orifices of the Ducts and the lower Jaw C.

T A B. XXV.

From Bidloo.

FIG. I.

Is a Fictitious Figure of the Muscles of the *Fauces* and *Oesophagus*.

FIG. II.

Shews the Stomach revers'd in this Print.

AA, The *Fundus* of the Stomach.

B, The lower part of the *Gula* or *Oesophagus*.

C, The *Pylorus* or right Orifice here represented the left.

D, The *Omentum* hanging down which lies on the Guts.

N. B. In this Figure the superior and inferior *Coronary* Blood-Vessels of the Stomach are very well express'd; the lower parting with slips to the *Omentum* as well as to the Stomach.

FIG. III.

The Texture of the *Peritonæum* examin'd by a Microscope.

AA, The *Nervous* and *Tendinous* Fibres, which pass accor-

ding to the length of the *Abdomen*.

BB, Other Fibres carried in a circular manner from the *Nervous Plexus* through the breadth of the *Abdomen*.

CC, The *Fibrille* which joyn the preceeding Fibres together, are complicated with them.

DD, Parts of the Blood-Vessels broke off.

FIG. IV.

The Process of the *Peritonæum* on the *Spermatick Vessels*.

AA, Part of the *Peritonæum*.

B, the Orifice or *Annulus* of its Process.

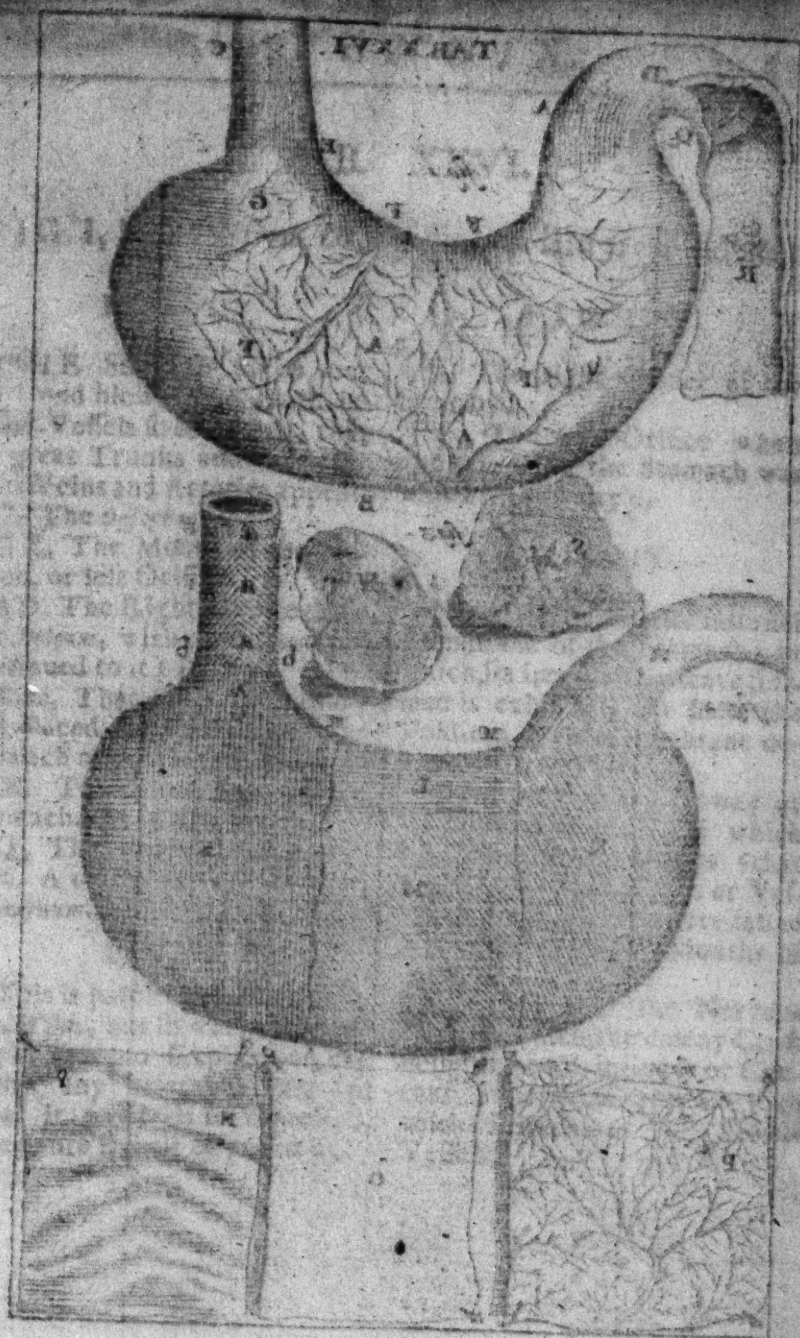
CC, The Blood-Vessels which pass to the *Testicles*, on which the internal *Lamina* of the *Peritonæum* is continued in half their progress between the *Inguina* and *Scrotum*, and is by some call'd *Diverticulum*, while the external *Lamina* of the *Peritonæum* is not only continued on those *Spermatick Vessels*, but provides a covering also for the *Testicle* it self, which is called *Tunica Vaginalis*.

T A B.

TAB. XIV.









T A B. XXVI.

FIG. I, II & IV from Dr. Willis, the III^d from Bidloo.

FIG. I.

THE Stomach taken out and blow'd up, with its Blood-Vessels so distended, that the great Trunks and Branches of its Veins and Arteries appear.

C, The *Oesophagus*.

GE, The Mouth of the Stomach, or left Orifice.

AD, The Right Orifice call'd the *Pylorus*, with the *Duodenum* continued to it; R.

Note, That A is by mistake also placed on the *Fundus* of the Stomach of this Figure as is FF.

B, The lower part of the Stomach.

Q, The Valve at the *Pylorus*.

R, A cluster of Glands in the *Duodenum*.

FIG. II.

This is patch'd together from Dr. Willis, but so very ill compos'd, that no Explication can afford any tolerable *Idea* of what it pretends to represent, wherefore it shall be pass'd by.

FIG. III.

S, The right Orifice of the Stomach.

T, The left Orifice when cut off, after the Stomach was blown up and dry'd.

FIG. IV.

N. A Portion of the internal Membrane of the Stomach; in which, its internal Concave Surface is exhibited, to shew the Foldings of that Membrane cover'd with its *Villi*,

O, A piece of the Downy or Glandulous Coat, in which its outward Superficies (that cleaves to the Nervous or Vascular Coat) appears very full of Glandules, and the Mouths of Vessels.

P, A piece of the Nervous Coat, in which, the downy Crust being remov'd, its inner or Concave Superficies appears with thick Branchings of Blood-Vessels.

T A B.

T A B. XXVII.

FIG. I & II according to Dr. Willis, the Vth from Peyrus, the rest from Swammerdam and Bartholin.

FIG. I.

A, THE external Membrane of one of the small Guts, which is borrow'd from the *Péritonæum*, and being very thin, the Longitudinal Fibres (which are placed immediately under it) do somewhat appear through it.

B, The Longitudinal Fibres of the Gut, cleared of the external Membrane.

C, The Circular Fibres which appear immediately under the Longitudinal: These two orders of Fibres are counted the second Tunick of the Intestine by Dr. Willis.

FIG. II.

B, The internal Concave Surface of the Nervous or Vascular Tunick, raised from the Villous Tunick, to shew its Vessels.

A, The external convex'd Surface of the Villous Tunick made bare, to shew its Glands and Mouths of its small Blood-Vessels.

FIG. III.

A, The external Surface of the Gut.

BBB, The Villous Tubes of the internal Surface of the Gut, in whose edges the small Channels appear.

FIG. IV.

Part of the *Intestinum Jejunum* dry'd and cut open.

A, Part of the Gut, call'd *Jejunum*.

B, Its inside.

CC, Part of it divided and hanging down, to shew its inside.

a a a, The *Valvula Conniventes*.

b b b, The external Marks of the *Connivent Valves* on the Surface of the Gut.

FIG. V.

A, The lower end of the *Ileum* cut open and expanded, to shew its inside.

B, The large Glandulous Plexus at the Extremity of the *Ileum*.

CC, The Valve of *Baubin* divided, in whose *Limbus* the *Solitary Glands* appear.

DD, A Portion of the *Colon* divided also according to its length and spread open, to shew its Glandules also.

EE, The Lenticular Solitary Glands, dispersed through the inward Tunick of the *Colon*.

F, The





FIG. III.

A. The external surface of the Gall.

B. The internal surface of the Gall, showing the folds of the Gallbladder.

C. The

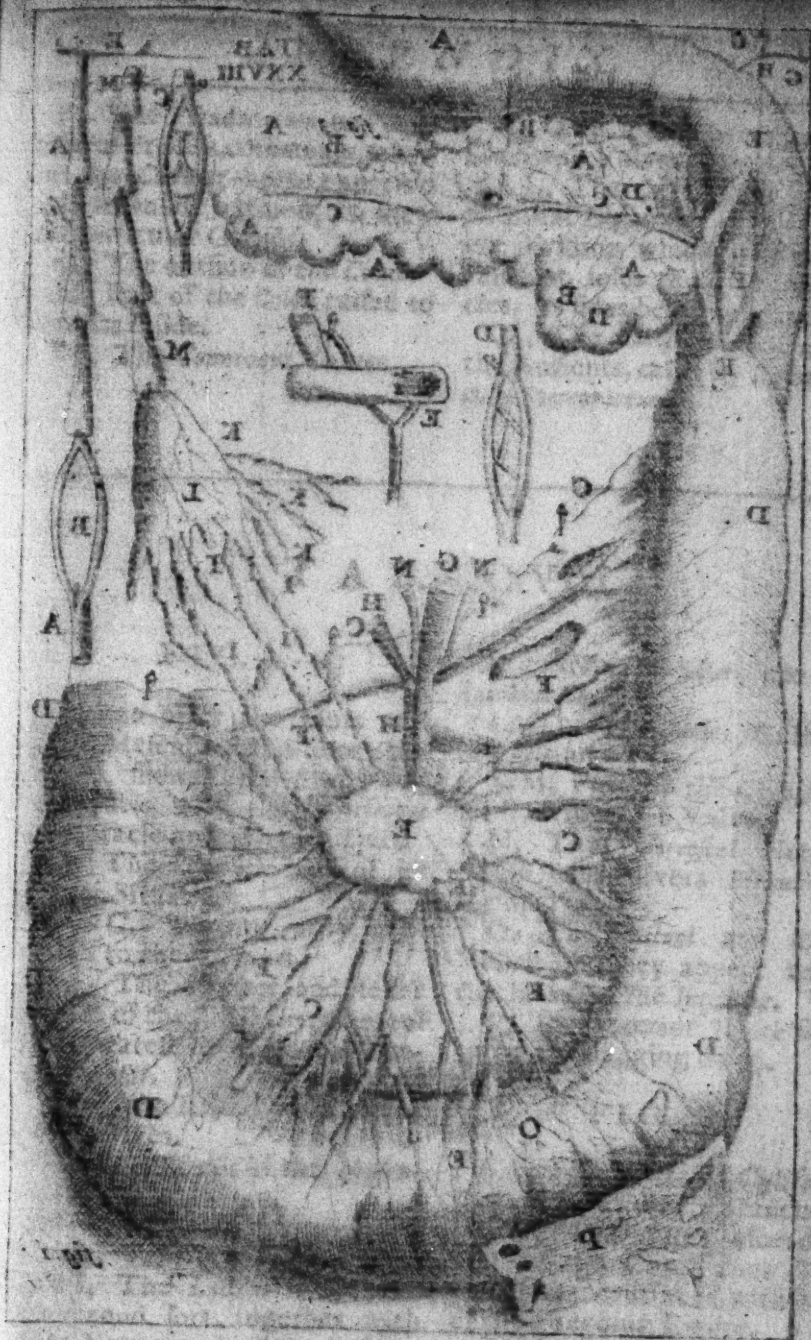


Fig. 1. The Heart of a Man, as it is found in the Body, with the great Vessels, and the Branches of the Arteries and Veins, as they are distributed to the Lungs, and the other Parts of the Body. The Letters A, B, C, D, E, F, G, H, I, K, L, M, N, O, P, Q, R, S, T, U, V, W, X, Y, Z, mark the several Parts, which are described in the following Table.



F, The *Pseudocatum* or Vermiform Process, commonly taken for the *Cæcum*, here express'd with its inside outmost, to shew its Lenticular Glands.

G, The outside of the *Colon*.

H, Part of the *Colon* rais'd to shew its inside.

I I, The *Connivent Valves*.

K, The space between the *Connivent Valves* open'd.

L L, The *Cells* made by the external Ligament of the *Colon*, on dividing which Ligament, this Gut loses those Prominencies, its sides becoming straight.

M, The *Intestinum Cæcum* of the Antients, call'd by some *Sacculus Stercoraceus*.

T A B. XXVIII.

FIG. I.

Done after the Guts and Mesentery, and some *Quadrupeds*, shews the Mesentery and its Vessels, with the Chyliferous Receptacle and Thoracick Duct.

A, The Ventricle out of its proper Situation.

CCC, The Mesentery connected to the *Jejunum*.

EE, The greater and lesser Glands of the Mesentery, whereof the greatest is call'd the *Pancreas Asellii*.

FFF, The Lacteal Vessels with their Valves.

G, The Trunk of the Mesenterick Artery.

HH, The Trunk of the Mesenterick Vein.

III, The Lacteal Vessels of the second sort, together with their Valves, which look from the Mesenterick Glands towards the Receptacle of the Chyle.

KKK, The Lymphatick Vessels

that go from the Liver into the *Sacculus Chyli*.

L, The Receptacle, or Cistern, or Chyle-bag.

MM, Part of the Chyliferous Duct, with their Valves.

N, The Intercostal Nerves, which make divers Plexus's in the Mesentery.

O, The Lacteal and Blood-Vessels, as they appear under the Tunick of the Intestine.

P, The exterior Tunick separated and hanging down.

FIG. II.

Shews the ascending Chyliferous Duct, with its divers Branches.

AA, The upper ascending part of the Chyliferous Duct, which was continued with MM of the foregoing Figure.

B, Its various Fissures and Branchings between the fourth and sixth Vertebra of the Thorax, through which some Intercostal Branches

Branches go from the great Artery; this Division often varies as in C and D.

EE, The Insertion of this Duct in the *Subclavian Vein*, at whose Orifice there is a *Semilunary Valve*.

F, The Insertion of the other Branch into the *Jugular Vein*.

FIG. III. From *De Graaf*.

Shews the true *Pancreas* with its Duct.

AAAA, The *Pancreas* open, that its Duct may appear.

BBBB, A great many Glands conglomerated which compass the *Pancreas*.

CCG, The Duct or Trunk of the *Pancreas*, running according to its length.

DDD, Lateral Ducts or Branches arising on both sides of the great Trunk, and dispersed into the Substance of the *Pancreas*.

EE, The *Intestinum Duodenum* opened, that the Insertion of the *Pancreatick Duct* may be seen.

F, The entrance of the common *Pancreatick* and *Biliary* passage into the *Duodenum*, about four Fingers breadth under the *Pylorus*.

GG, The *Cystick* and *Hepatick* Duct.

H, The common *Biliary Duct* inserted in the *Duodenum* F, and freed from the *Pancreas*, under which it lay hid.

T A B. XXIX.

FIG. I from *Bartholin*, the IIId from *Veslingius*, the rest according to *Dr. Glisson*, but alter'd by *Blancard*.

FIG. I.

THE hollow part of the Liver revers'd.

AA, The lower side or *Concave* part of the Liver.

B, Its external *Membrane* separated and hanging down.

CC, Two Trunks of the *Vena Cava* near the *Gibbous* part of the Liver.

D, The *Umbilical Vein* turn'd into a *Ligament*.

E, The Gall-Bladder on which a *Lympheduct* is express'd,

Near F the *Ductus Cysticus* of the Gall-Bladder is express'd.

g, The *Ductus Hepaticus*.

h, The common *Gall-Duct*.

I, One of the Arteries of the Liver.

K, The Branch which comes from the *Cæliack Artery*.

L, The Branch of the Artery which goes to the *Gall-Bladder*.

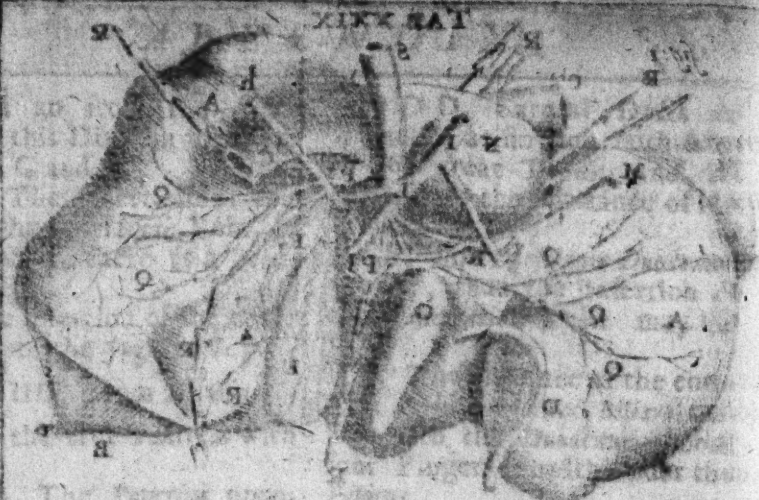
M, The

TAB. XXIX.



fig. 3.

Branches of the
Artery of the
Stomach
P. The
Branches
of the
Stomach
Artery



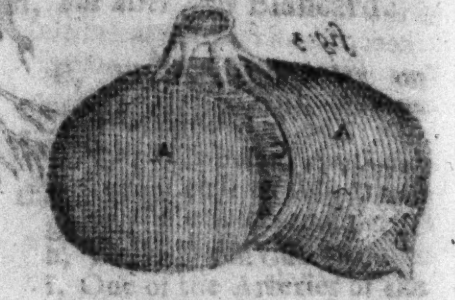
AAA, The common
artery of the
Stomach
BBB, The common
vein of the
Stomach
CCC, The common
artery of the
Stomach

DDD, The common
vein of the
Stomach
EEE, The common
artery of the
Stomach

FIG. 1



THE
Stomach
Artery
B, The external
artery of the
Stomach
C, The external
vein of the
Stomach
D, The external
artery of the
Stomach



One of the Arteries of the
Stomach
E, The Branch which
goes to the
Stomach
F, The Branch of the
Artery which
goes to the
Stomach

Cholera near the Gall-bladder of the
Liver

D, The Gall-bladder of the
Liver

into a Ligament

K, The Branch which
goes to the
Stomach

L, The Branch of the
Artery which
goes to the
Stomach

M, The

M, The Nerve from the *In-tercostalis*.

N, A small Lobe of the Liver to which the *Omentum* is annex'd.

O, Another Lobe or Eminence call'd one of the *Portæ*.

P, A *Lymphatick* Gland.

Q Q, The *Lympheducts* arising out of the Liver, which are here express'd very large, not being done after the Life.

RR, Other *Lympheducts* arising out of the Gland (PP) into which the former were inserted, which convey the *Lympha* immediately from thence into the *Sacculus Chyli*. N. B. This Progress of *Lympheducts* is true in Nature, tho' it is here done from Invention.

FIG. II.

Shews the *Capsula* of Dr. Glisson, together with the *Vena Portæ*, and the Ramifications of the *Hepatick Ducts*.

a a a, The common *Capsula* of Dr. Glisson opened.

B, The Trunk of the *Vena Portæ* towards the Gibbous part of the Liver.

cccc, The five Branches of the *Vena Portæ* distributed through the whole Liver.

D, The Subdivisions of the *Gall-Duct*, included in the common *Capsula* as they pass to the Glandulous Bodies at the Extremities of the *Portæ* and the other Vessels.

E, The common *Gall-Duct*.

F, Its opening into the *Duodenum*.

G. The *Gall-Bladder* open'd.

H, The *Ductus Cysthepatici*, which arise from the Liver, and discharge their *Gall* into the *Ductus Cysticus*, and Neck of the *Gall-Bladder*.

iii, Their Apertures.

kkk, The Communication of the *Cystick* and other *Gall-Ducts*.

FIG. III.

A A, The gibbous part of the Liver.

B, Its external Membrane separated.

C, Its Ligament called *Suspensorium*.

D, The *Vena Cava* dividing it self into Branches, as they come out of the Liver.

FIG. IV.

A, The *Gall-Bladder* open'd.

B B, The *Ductus Hepaticus*.

CCC, The *Ductus Cysthepatici*.

D, The *Ductus Hepaticus* open'd, that the *Cysthepatici* may be seen.

E, Another opening of the *Cysthepatick Ducts* into the *Gall-Bladder*, where a Valve is placed to prevent the return of the *Gall*.

FF, A *Gall-Duct* passing out of the Bladder into the Liver.

GG, The *Ductus Cysticus* joining with the *Ductus Hepaticus* and *Communis*.

HHH, Branches of the *Cysthepatick Ducts* dispers'd through the inside of the Liver.

I, *Vena Portæ*.

K, The *Ductus Communis* which carries the *Gall* to the *Duodenum*.

h

T A B.

T A B. XXX.

FIG. I.

AAAA, **T**HE Concave part of the Spleen from *Veslingius*, with the addition of the Lympheducts.

B, The Splenick Artery.

CC, The *Vena Porta*.

DD, The Lymphatick Vessels with their Valves.

E, The Intercoastal Nerves.

FIG. II.

Shews the Spleen of an Ox from Dr. *Higmore*.

AA, The Substance of the Spleen cover'd with its proper Tunick.

BB, The Tunick of the Spleen dissected and turn'd inside outwards, that the progress of the Vessels, and the Plexus of the Fibres may be seen better.

C, A part of the *Vena Porta*.

D, Its left Branch called the Splenick.

E, That Branch opened near the Spleen that the Valve may be seen.

F, A part of the Splenick Artery, which goes through the whole Spleen.

G, Nerves that go through the sides of the Splenick Artery.

HHH, The Artery going through the whole Spleen.

III, Nerves going through the sides of the Splenick Artery.

KKKK, Some Nervous Fibres very much complicated,

between which the Branches of the Artery run, and are lost in its vesiculous Substance.

N.B. Tho' Authors, particularly Dr. *Higmore*, have describ'd Valves in the *Vena Porta*, it is certain it has no Valves in it.

FIG. III.

Shews the Trunk of the great Artery, and the *Vena Cava*, &c. from *Veslingius*.

AA, The right and left Kidney in their proper place.

B, Its Tunick separated and hanging down.

CC, The *Glandula Renales*.

DD, The Trunk of the *Vena Cava*.

GG, The Trunk of the great Artery.

HH, The Emulgent Veins.

II, The Emulgent Arteries.

cc, The Arteries of the Testicles.

dd, The Veins of the Testicles.

ee, The Spermatick Blood-Vessels as they pass to the Testicles in one common covering of the *Peritoneum*.

f, The *Arteria Adiposa*.

g, The *Vena Adiposa*.

hh, The Ureters.

KK, A branching of the Arteries going towards the Thighs.

LL, A branching of the *Vena Cava* going towards the Thighs.

FIG. IV.

AAA, The Kidney dissected in the middle.

BBB, The



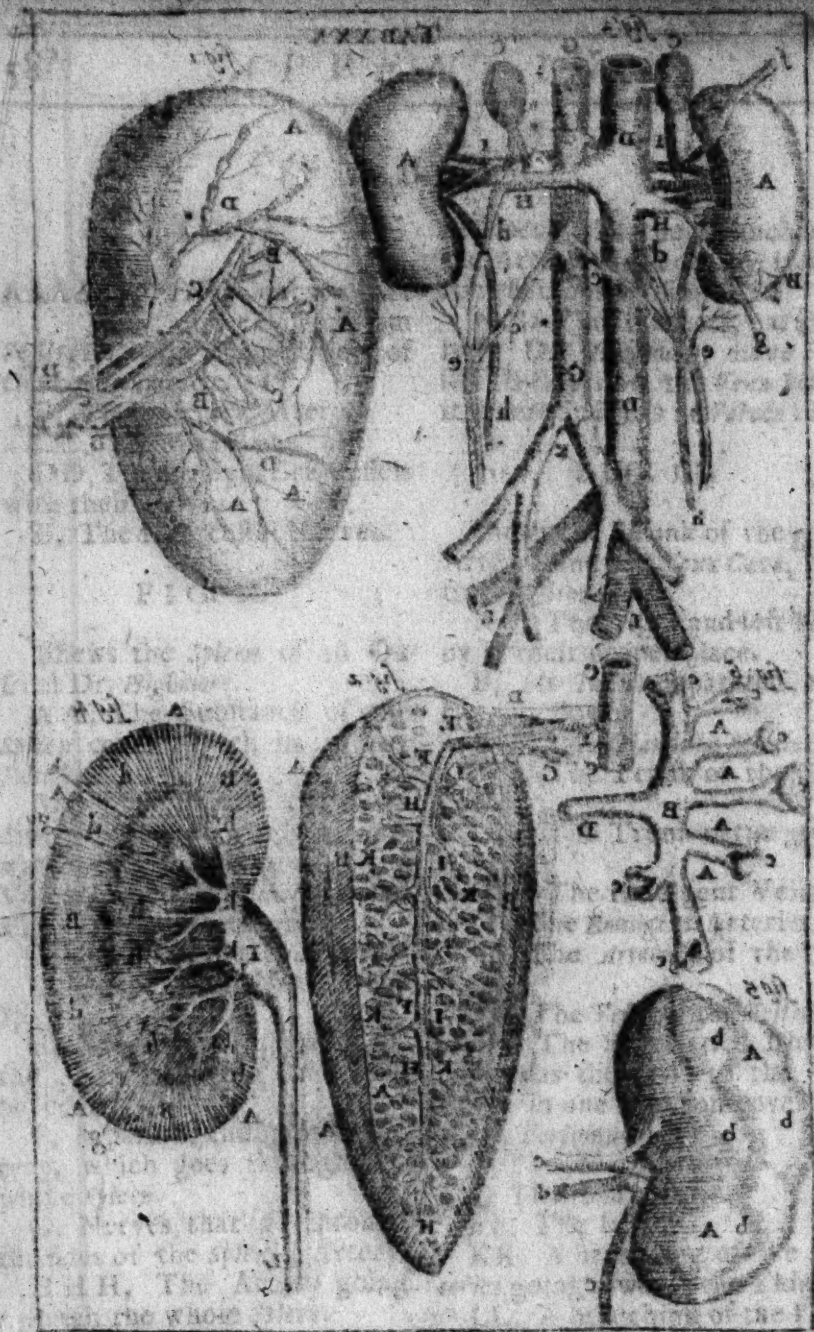


FIG. IV.
 KKKK. Some Nerves. H. The Kidney dissected
 very much complicated, in the middle.
 BBB, The



fig. 2.

TAB. XXXI.

fig. 3.



fig. 4.



fig. 5.



fig. 1.

BBB, The *Urinary Pipes* arising from the Glands of the Body of the Kidny, and passing towards the *Papilla*.

ddd, The glandulous *Acini* dispersed between the *Urinary passages*.

gg, The interior *Urinary Pipes* going from the glandulous *Acini* into the *Pelvis*, whose meeting together make as it were *Caruncles*, from which the *Urine* passes into the *Pelvis*.

hh, The *Caruncula* made by the meeting of the *Urinary Pipes*.

I, The *Pelvis*.

KKK, The beginnings of the *Pelvis* in the Kidny.

L, Part of the *Ureter* cut off.

FIG. V.

AA, A Childs Kidny divided into divers little Bodies, or Lobes, cover'd with one common Membrane.

bbb, Many Protuberancies of the little Bodies not yet joyned together.

c, The *Emulgent Artery*.

d, The *Emulgent Vein*.

e, The *Ureter*.

FIG. VI.

AAAA, The *Urinary Pipes* of the *Pelvis*.

B, The *Pelvis*.

cccc, The open ends of the Pipes of the *Pelvis*, which receive the *Caruncula*.

D, Part of the *Ureter* cut off near the *Pelvis*.

T A B. XXXI.

FIG. I, III, IV & V from Bidloo.

FIG. I.

Represents part of the *Liver* boiled, view'd through a Microscope.

AA, The *external Tunick* of the *Liver* rais'd.

BBBB, The *Glands* that compose the *Liver*.

C, The *Fibrous* and *Membranous* Connexion of these Bunches of *Glands*.

DE, The *Sanguinary* and *Biliary Vessels* distributed to the *Glands*.

FIG. II.

Shews the Kidny dissected from the gibbous part to the *Pelvis*.

AAAA, The glandulous *Acini* dispers'd through the Kidnies.

BBBB, The *Urinous Pipes*, which convey the *Urine* from the glandulous *Acini* into the *Pelvis*.

C, The *Pelvis*.

D, The Mouth of the *Ureter*.

FIG. III.

Shews the Vessels of the Kidnies, *Pelvis* and *Urinous Ducts*.

h 2

AAAA, One

AAAA, One half of the Kidney dissected from the other.

BBBB, Urinary Pipes going from the glandulous *Acini* to the *Pelvis*.

CCCC, The glandulous *Acini*.

D, The *Pelvis*.

E, The *Ureter*.

FFF, The Emulgent Vessels.

FIG. IV.

The whole Kidney divided from its gibbous part to the *Pelvis* and display'd.

AAAA, The Kidney dissected.

BB, The Urinary Pipes.

CCC, The *Glands* which compose the external Surface of the Kidney.

D, The *Pelvis*.

EEEE, The places where the Urine comes out of the glandulous Pipes into the *Pelvis*, call'd the *Caruncula*.

F, The way out of the *Pelvis* into the *Ureter*.

G. The *Ureter* passing down.

FIG. V.

The Blood-Vessels and Urinary Tubes of the Kidney, express'd by a Microscope.

A, The proper Membrane of the Kidney.

BB, The ends of the Blood-Vessels broke off.

CC, The Blood-Vessels of the Kidney, which help to compose its *Glands*.

DD, The *Glands* of the Kidney composed of Blood-Vessels, Urinary Tubes, Nerves and Lympheducts.

E, The Urinary Tubes, in their way from the *Glands* to the *Papilla*.

F, The Urinary Tubes cut off, which pass'd to *Glands* beyond those here express'd.

G, The *Caruncula* or Papillary Body fram'd by meeting of the Urinary Tubes.

H, A Branch of the *Pelvis* cut off, which receives the Urine from the Tubes of the *Caruncula*.

T A B. XXXII.

From Regn. de Graaf.

FIG. I.

a, THE Trunk of the Vein of the *Testicle* cut from the *Vena Cava*.

bb, Branches of this Vein which arise from the *Peritoneum*.

c, Its first division into two Branches, which are vari-

ously subdivided and united again.

ddd, The *Valves* which appear like Knots when the Vein is distended with Wind or Wax.

eee, The various Divisions and Unions of the Veins, by which the reflux Blood (after the *Semen* is prepared in the *Testicle*)

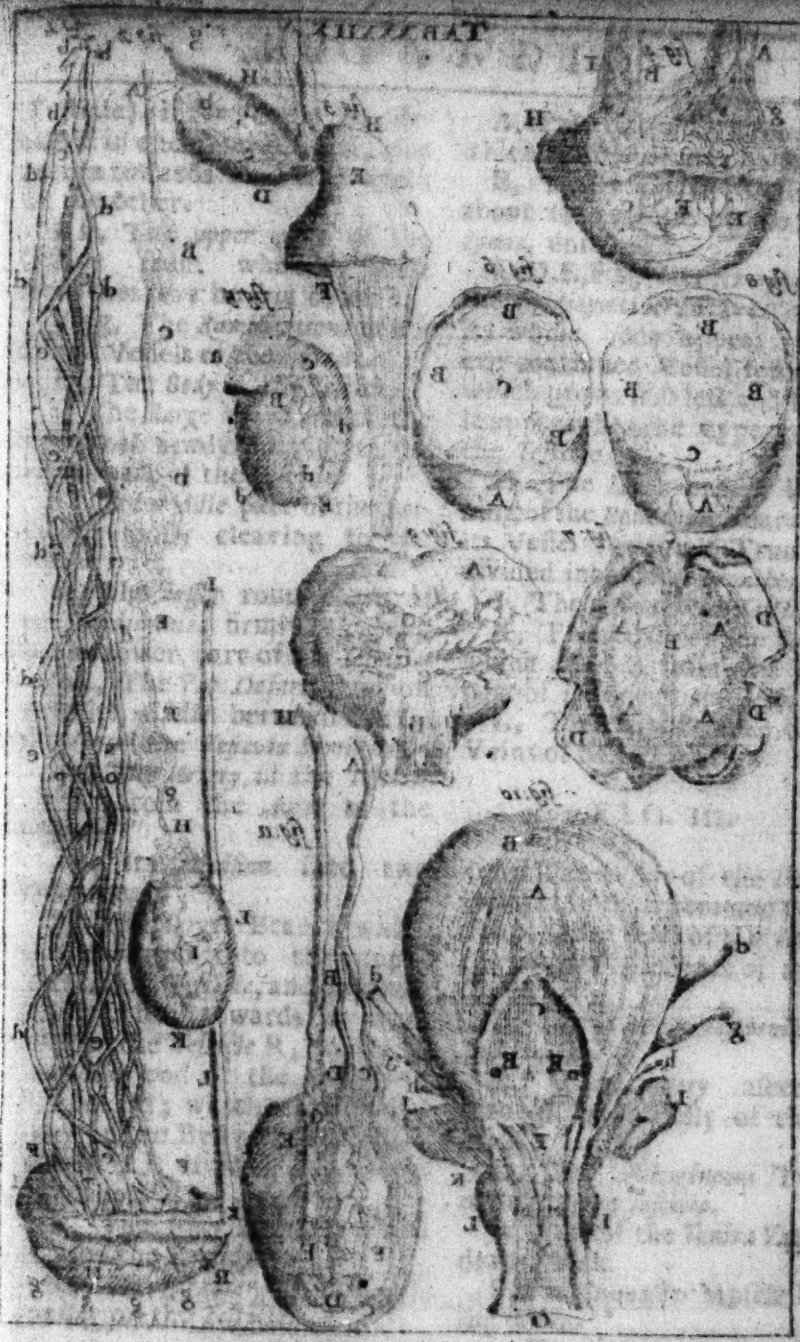


Fig. 1. The duct of the
 Testis.

Fig. 2. The duct of the
 Uterus.

Fig. 3.



THE various Divisions of the Veins, which arise from the Peritoneum, and Quies of the Veins, C. Its first division into two, which the reddest Blood (arterial Blood), which are very, the same is prepared in the

Testicle) if it should be detain'd in one Ramification, may return towards the Heart again by the other.

FF, The upper part of the Testicle from whence these Branches may be said to arise.

ggg, The Ramifications of the Blood-Vessels of the Testicle.

H, The Body of the Testicle.

I, The large round end of the Epididymis firmly cleaving to the upper part of the Testicle.

S, The middle part of the Epididymis loosely cleaving to the Testicle.

K, The lesser round part of the Epididymis, firmly cleaving to the lower part of the Testicle.

LL, The Vas Deferens cut off near its middle between the Testicle and the Vesicula Seminalis.

M, The Artery of the Testicle passing from the Aorta to the Testicle.

N, Its division into two Branches.

O, The larger Branch which is implanted into the upper part of the Testicle, and descends along its back towards the lower part of the Testicle R, to which, the lesser end of the Epididymis is annex'd; which again passes back on the Belly of the Testicle, where it is divided into divers Branches.

P, The lesser Branch which runs to the Epididymis.

R, The greater Branch descending on the Testicle.

FIG. II.

The Vas Deferens and part of the Epididymis unravell'd.

A, Part of the Vas Deferens in which its Cavity may be seen.

B, The Serpentine Turnings, about the middle of the Epididymis, unravell'd.

C,D,E,F,g, Divers parts of the Epididymis so unravell'd, that its whole body appears to be one continued Vessel folded up, which grows still less and less as it approaches the upper part of the Testicle.

H, The larger end or beginning of the Epididymis, near which its Vessel (or single Trunk) is divided into divers Branches.

I, The Belly of the Testicle.

K, The Artery of the Testicle, which ascends from the lower part of it though its Belly.

L, The Ramifications of the Veins of the Testicle.

FIG. III.

A, The Vessels of the Testicles inclosed in their common Trunk.

bb, The Veins of the Testicles running to the sides of the Testicles.

B, The Tunick Elythroides, or Erythroides.

c, The Artery ascending through the Belly of the Testicle.

D, The Albugineous Tunick inclosing the Testicle.

E, Part of the Tunica Vaginalis drawn back.

F, The Cremaster Muscle hanging down.

g, The greater round end of the Epididymis.

H, The middle part of the same.

I, The

- I, The *lesser* end of the same.
K, The *Vas Deferens* cut off.

FIG. IV.

Shews a *Dogs* Testicle.

A, The *Blood-Vessels* as they lye in their proper covering.

B, Their *Branches* tending to the *Epididymis*.

C, The *chief* Branch of the Artery of the Testicles passing through the Belly of the Testicle.

EE, The Branchings of the Veins.

F, The Testicle with the Seed in it.

g, The greater end of the *Epididymis* full of Seed.

H, The *lesser* end of the same extended with the Seed.

I, The end of the *Epididymis*, or the beginning of the *Vas Deferens*.

K, The *Vas Deferens* bound about in the *Inguen* of a Dog before Coition, without hurting the *Vasa Præparantia*, that the *Seminary* Vessels, when full of Seed, may be seen distended.

FIG. V.

a, The greater end of the *Epididymis* turn'd *inside* outwards, that the Ducts and Branches of the *Epididymis*, and their course, may be view'd.

B, The upper part of the Testicle, from which the *Seminal* Vessels go, which compose the greater end of the *Epididymis*.

c, The Vessels of the Testicles cut off.

ddd, The Branchings of the Vessels of the Testicles.

E, The Body of the Testicle of a Dog.

FIG. VI.

A, The Testicle of a Dog cut a-cross.

BBB, The *Seminal* Vessels as they lye between the Membranes in a peculiar order.

C, The Root of the *Epididymis* describ'd by Dr. Highmore.

FIG. VII.

AAAA, The *Seminal* Vessels of the Testicles placed in a peculiar order between the smaller Membranes.

B, The *Seminal* Vessels going through that Membranous Substance that joyns to the back of the Testicles.

C, Divers *Seminal* Vessels perforating the *albuginous* Tunick cut off, before they make up the round end of the *Epididymis*, after a *Serpentine* manner, as may be seen in Figure II. H.

DDDD, The *albuginous* Tunick open'd in the fore-part of the Testicle, and separated from it.

FIG. VIII.

A, The Testicle cut a-cross.

BBB, The several Dispositions of the *Seminal* Vessels.

C, The meeting of all the Membranes which part the *Seminal* Vessels at the back of the Testicle.

FIG.

FIG. IX.

AA, The Body of the *Prostates* divided in the fore-part.

B, The *Urethra* open'd also in the upper-part.

CCC, The *Ducts* of the *Prostate* or *glandulous* Body denudated.

O, The place of the *Caruncle* through which the *Seed* passes from the *Testicles* and *Vesiculae Seminales*, into the *Urethra*.

FIG. X.

A, The *Bladder* of *Urine*.

B, That part of the *Bladder* to which the *Urachus* is join'd.

CA, The *Bladder* open'd in the fore-part.

dd, The *Ureters*.

EE, The *Orifice* of the *Ureters* in the *Bladder*.

F, The *Neck* of the *Bladder* open'd.

gg, Parts of the *Vasa Deferentia* cut off.

hh, *Vessels* going to the *Vesiculae Seminales*.

II, The *Vesiculae Seminales* distended.

K, The *Caruncle* with its two *Foramina* through which the *Seed* passes from the *Vesiculae Seminales* into the *Urethra*.

LL, The *glandulous* Body or *Prostates* divided in the fore-part.

MM, The *Mouths* of the *Ducts* of the *Prostates* opening at the sides of the *Caruncle*, which if not distended are imperceptible, or seem no bigger than *Points*.

FIG. XI.

A, The *Artery* of the *Testicle*, as it is generally found in *Humane* Bodies.

B, The *Division* of the same *Artery* into two *Branches*.

CC, The *greater* Branch going to the *Testicle*.

DD, The *lesser* Branch passing to the *Epididymis*.

E, The *greater* end of the *Epididymis* joining to the *Testicles*.

FF, The *Epididymis* turn'd inside outwards, to see which way the *Artery* goes under it.

G, The end of the *Epididymis*.

H, A part of the *Vas Deferens*.

T A B.

T A B. XXXIII.

From De Graaf.

FIG. I.

Shews the Communication of the *Vasa Deferentia* with the *Vesiculæ Seminales*.

AA, Parts of the *Vasa Deferentia*, with small Cavities appearing in their thick sides where they are cut off.

B, Those parts of the *Vasa Deferentia*, where their Cavities are dilated, and their sides thinner.

CC, The Extremities of the *Vasa Deferentia* again contracted, and opening with a small Foramen into the Neck of the *Vesiculæ Seminales*.

DDEE, The *Vesiculæ Seminales*, blow'd up to shew the Turnings and Windings of their Surface.

FF, The Vessels passing to the *Vesiculæ*—

g, The Membranes which hold the *Vesiculæ Seminales* and *Vasa Deferentia* in their natural Situation.

HH, The Blood-Vessels that accompany the *Vasa Deferentia*, and give Branches to their sides.

I, The common Ducts to the *Vesiculæ Seminales* and *Vasa Deferentia*, which pass distinctly on each side to their Appertures, at the sides of the *Caput Gallinaginis* or *Caruncula*.

KK, The Orifices of the Ducts of the *Prostates*, which open into the *Urethra* of the sides of *Caput Gallinaginis* or *Caruncle*.

LL, The *Prostata* and *Urethra* divided on their fore-parts, to shew the inside of the

MM, *Urethra*.

FIG. II.

The back parts of the *Penis*, *Vesiculæ Seminales* and *Prostates*.

AA, Portions of the *Vasa Deferentia*.

B, Those parts of the *Deferentia* which are dilated.

CC, The Vessels that go to the *Vesiculæ Seminales*.

DD, The *Vesiculæ Seminales* blow'd up.

EE, The back-part of the *Prostates* which lay on the *Intestinum Rectum*.

F, The *Urethra*.

g, The meeting of the *Vasa Deferentia* with the *Vesiculæ Seminales*.

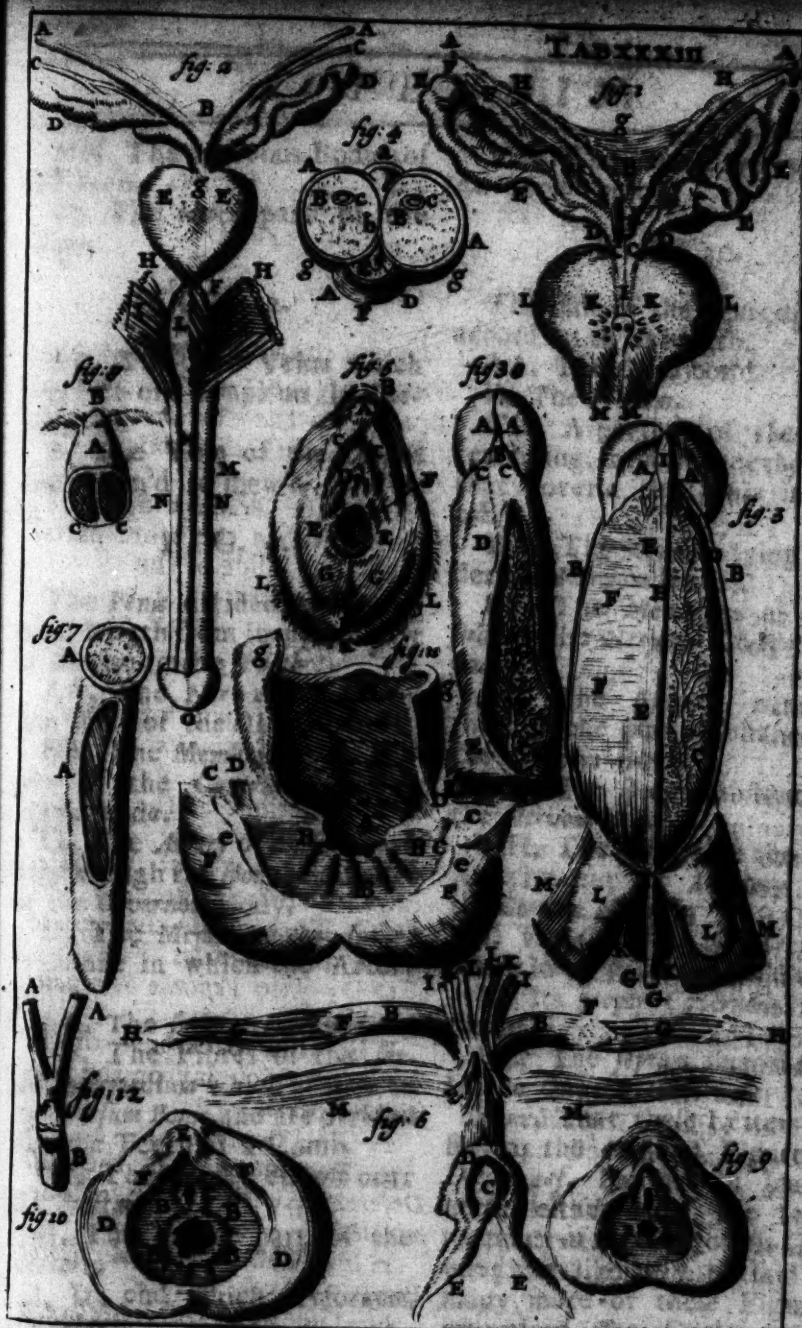
HH, The *Musculi directores Penis*.

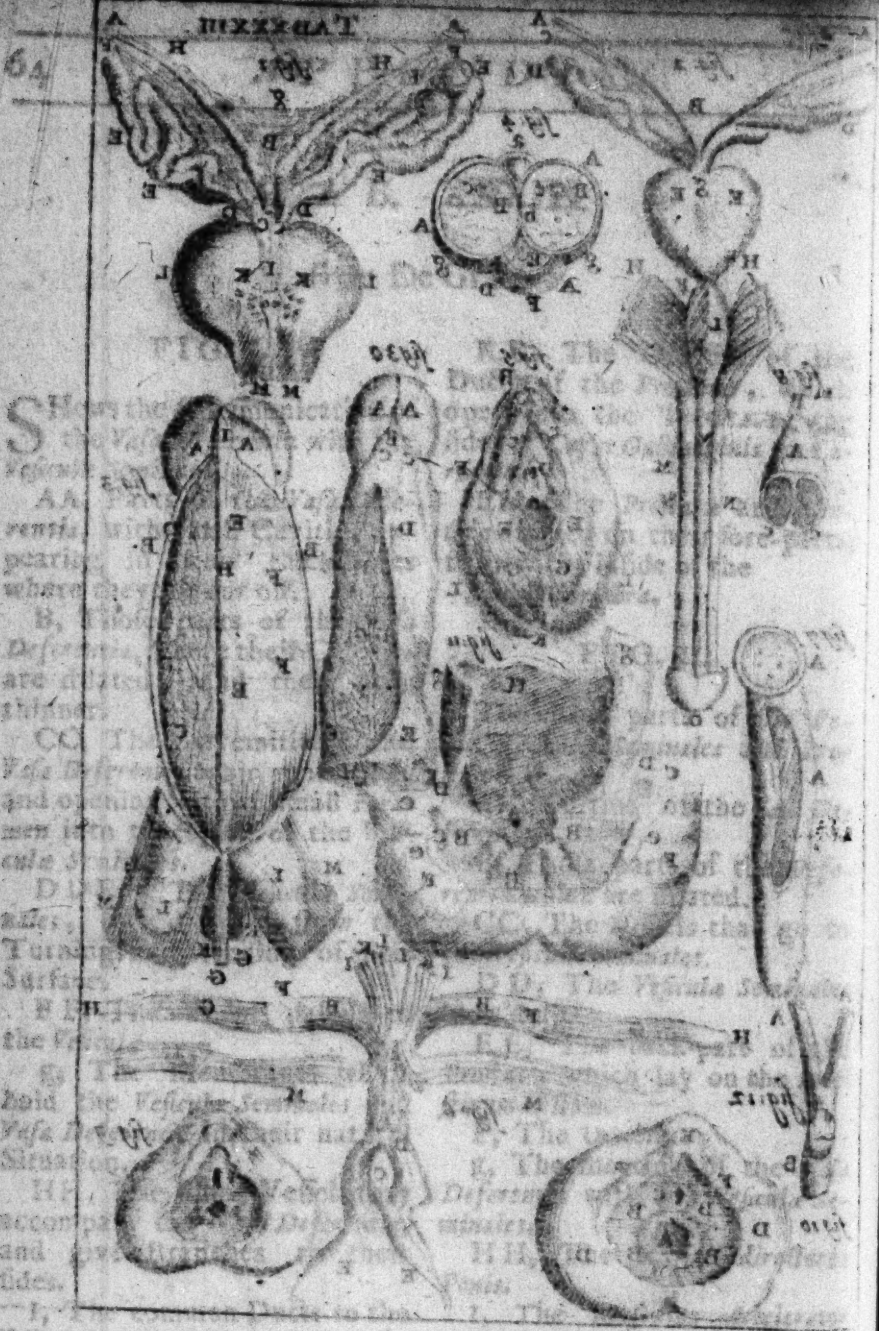
I, The *Musculus Accelerator* rais'd on one side.

L, The Bulbous part of the *Urethra* underneath.

M, The *Urethra* with its spongy part on it

NN, The





S. Hæc sunt præputia et Vasa Defe-
 rentia, quæ pascuntur distincte on
 rentia, quæ pascuntur distincte on
 pearia, quæ pascuntur distincte on
 where they are distincte on
 B. Hæc sunt præputia et Vasa Defe-
 rentia, quæ pascuntur distincte on
 are distincte on
 thinner.
 CC. The Fallopian Tube
 Vasa Defe-
 rentia, quæ pascuntur distincte on
 and opening into the
 men into the
 cule of the
 D. The Clitoris
 mules,
 T. The Uterus
 Surface
 F. Hæc sunt præputia et Vasa Defe-
 rentia, quæ pascuntur distincte on
 the Fallopian Tube
 E. The Fallopian Tube
 hold the Vasa Defe-
 rentia, quæ pascuntur distincte on
 Vasa Defe-
 rentia, quæ pascuntur distincte on
 Situation
 H. The Cervix Uteri
 accom-
 panied by the
 and opening into the
 sides.

raised on one side.
 I. The Fallopian part of the
 uterus underneath.
 M. The Uterus with its pos-
 sible part on it.

NN, The Nervous Bodies of the *Penis*.

O, The lower part of the *Glans*.

FIG. 12.

AA, The two Veins which joyn into one Trunk on the *Dorsum penis*.

B, The Vein of the *Dorsum Penis* open'd to shew a valve in it.

FIG. 3.

The *Penis* divided according to its length from its upper part or *Dorsum* to the *Urethra*.

AA, The Nervous or Cavernous Body of the *Glans* divided.

BB, The Membranes or Capsulae of the Cavernous Bodies drawn aside.

C, The Artery of on side passing through the spongy substance of the Cavernous Body.

D, The Membranaceous spongy substance in which the Artery passes.

EE, The septum intermedium.

FF, The Fibres of the septum intermedium which ascend to the *Dorsum Penis*, and are divided like the Teeth of a Comb.

GG, The *Urethra* cut off near the *Prostates*.

H, The middle part of the *Urethra*.

I, Its end which perforates the *Glans*.

KK, The spongy substance of the *Urethra*.

LL, The beginnings of the Cavernous Bodies dilated like two little Bags.

MM, The Musculi *Erigentes* or *extendentes penem*.

FIG. 30.

The side of the *Penis* open'd according to its length.

AA, The *Glans* bor'd.

B, The *Frenum*.

CC, A portion of the *Skin* remaining, from whence the rest that cover'd the *Penis* is cut off.

DD, The *Urethra* lying under the Nervous Bodies.

EE, The Membrane or Capsula of the Nervous Body divided.

FF, The Artery running through the spongy substance of the Nervous Body.

GG, The spongy substance of the Nervous Body.

HH, The Orifices of the two Arteries cut off as they pass the *Corpora Nervosa*.

I, The Cavity of the *Urethra*, whose lower part is cover'd with

K, Its proper Cavernous substance.

LL, The septum intermedium of the *Corpora Cavernosa Penis*.

Note, That these Letters refer to the original Figure of *De Graaf*, but are ill placed here, either thro' the Inadvertency of *Blancard*, or his Graver; the like may be said of many more of these Figures, wheretore the Curious must have recourse to the Originals.

FIG.

FIG. 4.

Part of the *Penis* cut Transversly.

AA, The *spongy* and *fibrous* substance of the *Nervous Bodies*.

bb, The two *Arteries* which pass through the *Corpora Cavernosa*.

C, The *Meatus Urinarius*.

D, The *spongy* substance of the *Urethra*.

E, The *septum intermedium*.

FF, The *Capsula* or *strong Membrane* of the *Corpora Nervosa*.

G, The *thin Membrane* on the *Cavernous substance* of the *Urethra*.

H, The large *Vein* passing on the back of the *Penis*.

FIG. 5.

The *Pudendum* of a *Woman*.

A, The *Glans Clitoridis*.

B, Its *Præputium*.

CC, The *Nympha*.

D, The *Meatus Urinarius*.

EEE, The *Coarctation* of the *Orifice* of the *Vagina* as we found it, (says *De Graaf*) in a *Virgin* of 24 years old.

F, The *Orifice* of the *Vagina* a little dilated.

GG, The *Labia pudendi* drawn from each other.

H, The *Seam* or little *Bridle* of the *Lips*.

I, The *Perinaum*.

K, Part of the *Anus*.

FIG. 6.

The forepart of the *Clitoris*.

A, The *Clitoris*.

B, Its *Crura*.

C, Its *Glans*.

D, Its *Præputium*.

EE, The *Nympha*.

FF, Part of the *Periosteum* by which the *crura* of the *Clitoris* is annex to lower part of the *Ossa Pubis*.

GG, The *Muscles* of the *Clitoris*.

HH, Those parts of its *Muscles* implanted on the *Ossa Ischii* or *Coxendicis*.

II, The *Nerves*,

KK, The *Arteries*,

LL, The *Veins*,

which pass to all the parts of the *Pudendum*.

MM, The *fleshy Fibres* of the *sphincter Muscle* annex to the *Nervous substance* of the *Clitoris*.

FIG. 7, and 8.

Parts of the *Clitoris* variously dissected.

A, Fig. 7. The *spongy substance* of one of the *Crura* without a *septum intermedium*.

A, The *Clitoris*.

B, The *Glans Clitoridis* with parts of the *Nympha*.

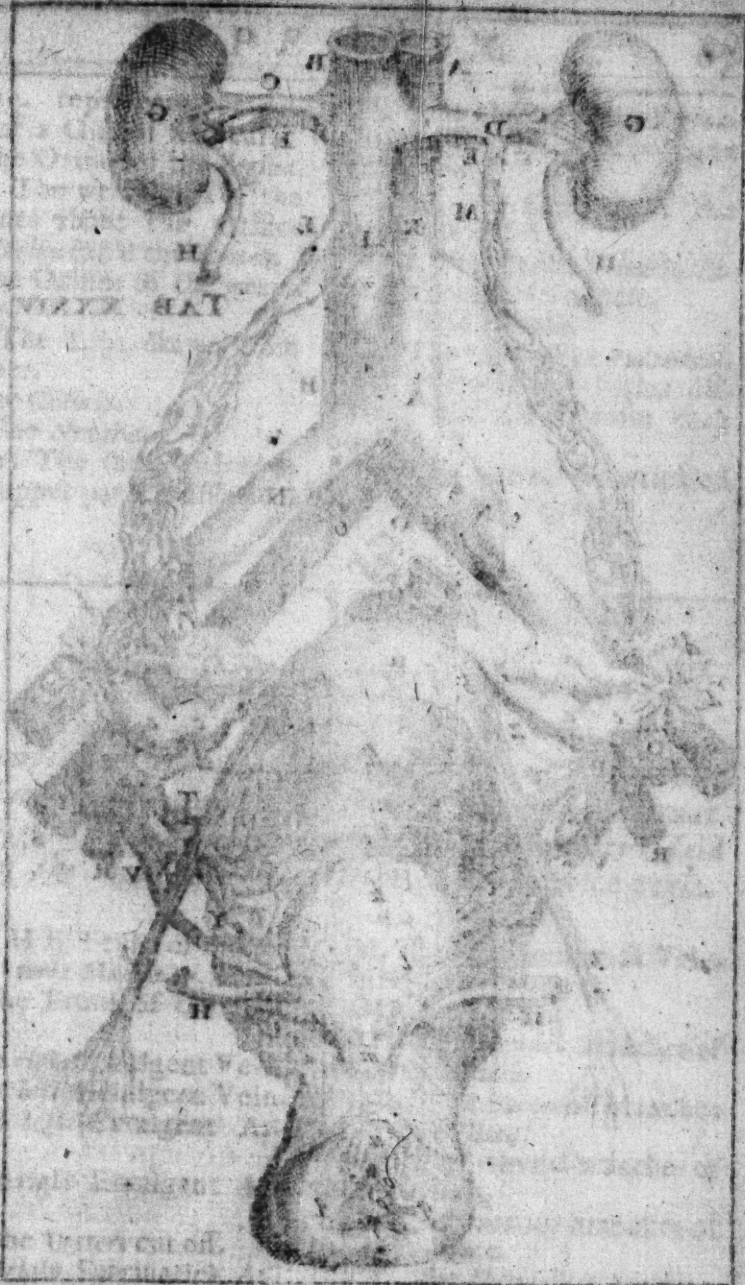
CC, The *spongy substances* of the *Clitoris* divided from each other by a *septum*.

FIG. 9, 10, 11.

Shews the *Conformation* of the *Orifices* of the *Vagina*, as they are found in young *Bodies* of different *Ages*.

Fig. 9. represents the *Pudendum* of an *Infant*.

Fig. 10.



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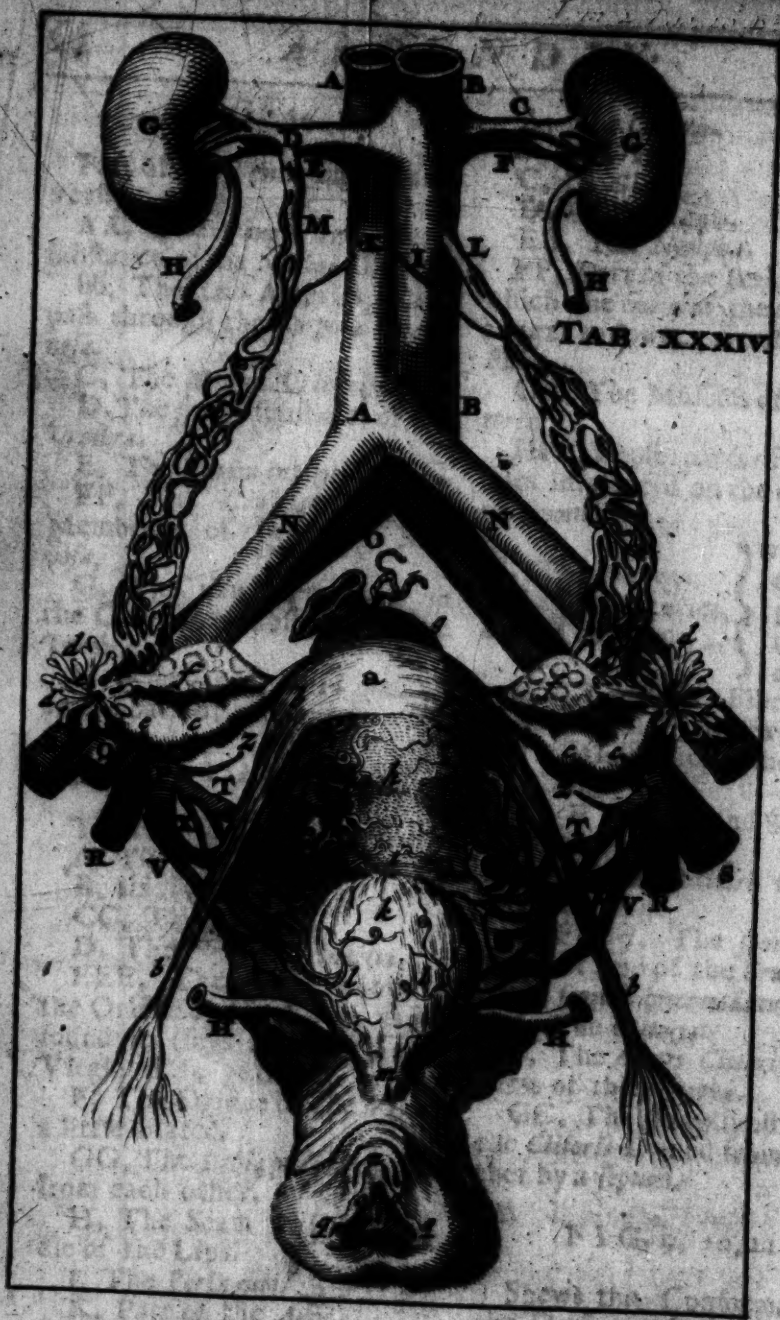
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Fig. 10. represents the *Pudendum* of a Girl of six years.

A, The Orifice of the *Vagina*.

BBB, The wrinklins of the Membranes about the Orifice of the *Vagina* call'd the *Hymen*.

C, The Orifice of the *meatus Urinarius*.

DD, The Lips drawn from each other.

E, The *Clitoris*.

FF, The *Nympha*.

Fig. 11. The same *Pudendum* after its upper part is dissected.

A, The Orifice of the *Vagina*.
BB, Its *rugous* Membrane call'd *Hymen*.

CCC, The forepart of the *Vagina* cut off.

DD, The *Meatus Urinarius* divided through its middle.

ee, The *Nympha*.

FF, The Lips of the *Pudendum*.

gg, Parts of the *Vagina* dissected, and drawn from each other.

H, The *Internal* or wrinkled Tunick of the *Vagina*.

T A B. XXXIV.

The foreparts of the *Genitals* of a Woman taken out of the Body, and plac'd in their natural site from Regnerus de Graaf. This Figure shews the Parts *reversè*; that which here is said to be of the Right side being of the Left, and vice versa.

AA, THE Trunk of the *Arteria Magna*.

BB, The Trunk of the *Vena Cava*.

C, The right Emulgent Vein.

D, The left Emulgent Vein.

E, The left Emulgent Artery.

F, The right Emulgent Artery.

HH, The *Ureters* cut off.

I, The right *Spermatick* Artery.

K, The left *Spermatick* Artery.

L, The right *Spermatick* Vein.

M, The left *Spermatick* Vein.

NN, *Arteria Iliaca*.

OO, *Vena Iliaca*.

PP, The internal branches of the *Arteria Iliaca*.

QQ, The external branches of *Arteria Iliaca*.

RR, The internal branches of the *Vena Iliaca*.

SS, The external branches of the *Vena Iliaca*.

TT, The *Hypogastrick* Arteries that go to the *Uterus* and *Vagina*.

VV, The *Hypogastrick* Veins that go along with the said Arteries.

XX, The *branches* of the *Hypogastrick* Arteries that go to the Urinary Bladder.

YY, The *branches* of the *Hypogastrick* Veins that go to the Bladder.

ZZ, *Portions* of the *Umbilical* Arteries.

a, The bottom of the *Uterus* cover'd with its common *Tunick*.

bb, The round *Ligaments* of the *Uterus* as they are joyn'd together in its bottom.

cc, The *Tubæ Fallopianæ* in their natural position.

dd, The *edges* of the *Tubes*.

ee, The *Foramina* of the *Tubes*.

ff, The *Testicles* in their na-

tural position.

g, A portion of the *Rectum*.

h, The neck of the *Womb* without its *Tunick*, that the *Vessels* may be seen the better.

i, The forepart of the *Vagina* of the *Uterus* freed from the *Urinary* Bladder.

k, The *Urinary* Bladder contracted.

ll, The *Sanguineous* *Vessels* running through the *Bladder*.

m, The *Musculus Sphincter* of the neck of the *Bladder*.

n, The *Clitoris*.

oo, The *Nymphae*.

p, The *Urinary* passage.

qq, The *Lips* of the *Pudendum*.

r, The *Orifice* of the *Vagina*.

T A B. XXXV.

All from de Graaf.

The Bladder of Urine and Uterus, &c. of a Woman.

FIG. I.

THE forepart of the *Uretbra* with part of the *Bladder* of the *Urine* open'd.

A, The *Bladder* of *Urine*.

C, The neck of the *Bladder* open'd.

D, The *Uretbra* open'd according to its length.

E, The *Orifice* of the *Uretbra*, and the passages of the *Lacuna* into it.

FF, The *Lacuna* going through the *Prostata*.

FF, The *Lacuna* taken out of

the *Glandulous* *Body* of the *Prostata*, and blown up.

GG, The internal substance of the *Prostata*, or the *Glandulous* *Body*.

II, The sides of the *Bladder* of *Urine* separated from one another after the division.

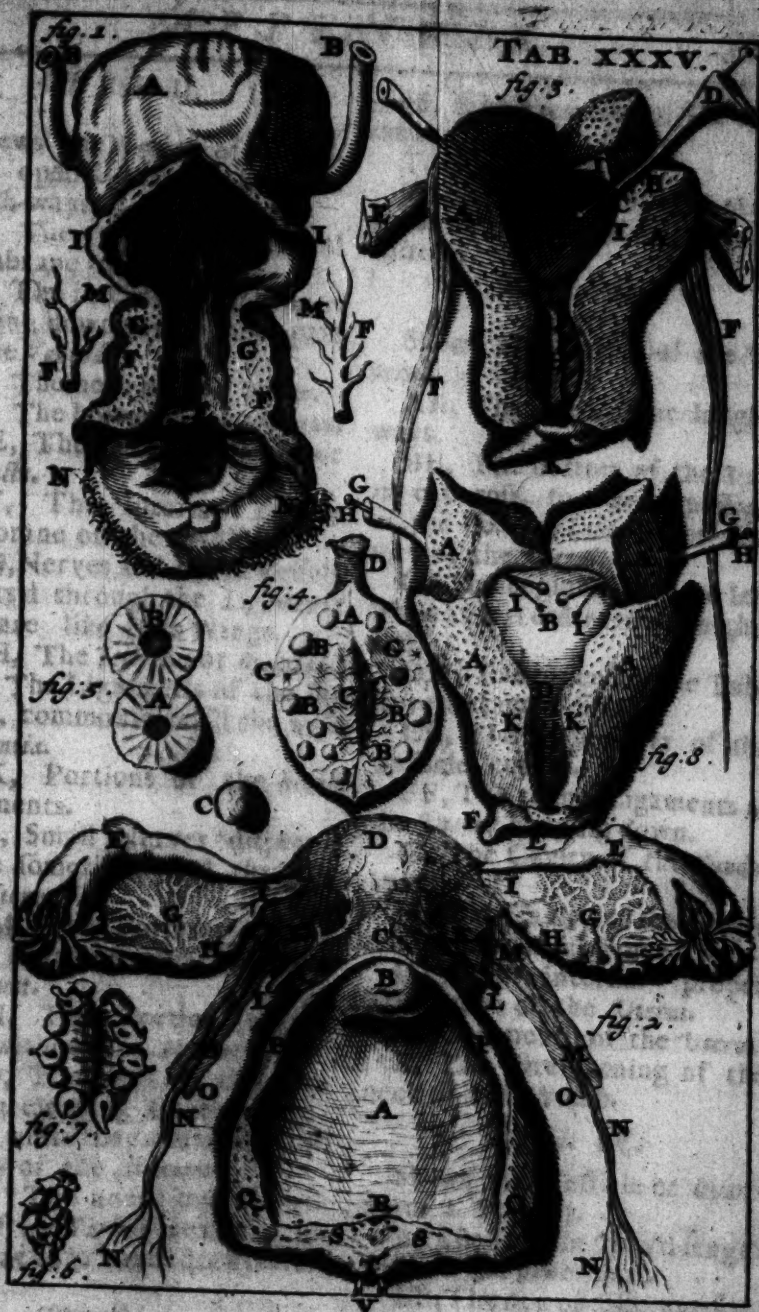
BB, The *Ureters* cut off.

NN, The *Lips* of the *pudendum*.

L, The *Orifice* of the *Vagina*.

MM, The *carnous* *Fibres* of the *Sphincter* cut off.

FIG.



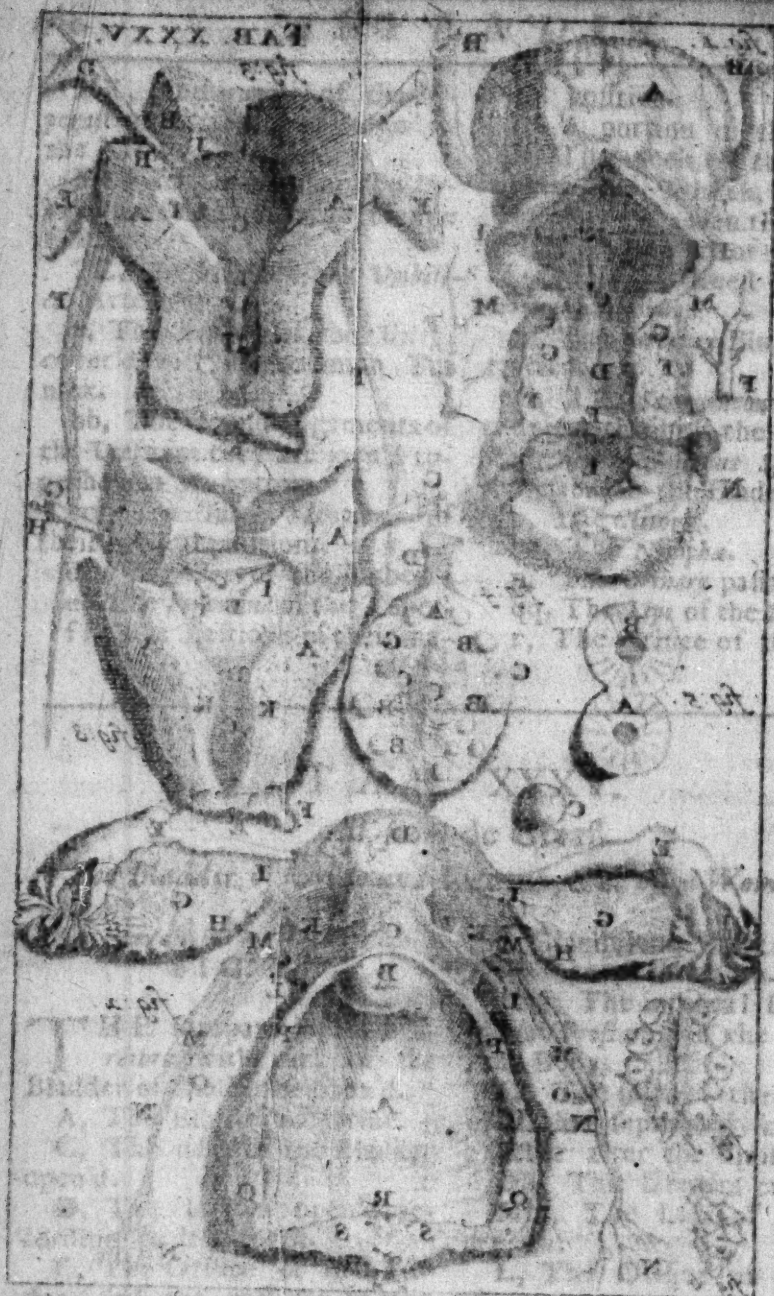


FIG. II.

Shews the *Vagina* of the *Uterus* open'd on the backside length-ways.

A, The wrinkled internal Membrane of the *Vagina*.

B, The internal *Osculum uteri* bending down at the upper part of the *Vagina*.

C, The neck of the *Uterus*.

D, The bottom of the *Uterus*.

EE, The *Tubæ Fallopianæ*, or *Oviducts*.

FF, The internal rugous membrane of the *Oviducts*.

GG, Nerves and Blood Vessels dispers'd through the *Ligaments* that are like *Bats Wings*.

HH, The *Testicles* or *Ovaria*.

II, The *Ligaments* of the *Testicles*, commonly call'd the *vasa deferentia*.

KK, Portions of the broad *Ligaments*.

LL, Small Nerves dispers'd (as we sometimes see) through the *Uterus*.

MM, The Portions of the round *Ligaments* that lie in the *Abdomen*.

NN, The Portions of the same without the *Abdomen*.

OO, The parts of the *Peritoneum* cleaving to the *Ligaments* while they are within the Cavity of the *Abdomen*.

PP, The under and thinner part of the *Vagina* next the *Rectum* cut thro' and drawn asunder.

QQ, The thickness of the membranous substance that is in the lower part of the *Vagina*.

R, The Orifice of the *Urinary* passage.

SS, The *Foramina* of the *Lacuna*.

T, The *Clitoris*.

V, Considerable Nerves that go on the outside or back of the *Clitoris*.

FIG. III.

Shews the Cavity of the *Uterus*.

AA, The *Uterus* cut length ways.

BB, The bottom of the *Uterus* cut cross, to see the passage of the *Fallopian Tube* in the Cavity of the *Uterus*.

C, The beginning of the left *Tube* as it is ordinarily freightned.

DD, The process of the *Tube* more and more dilated.

EE, The *Ligaments* of the *Testicles* cut off.

FF, The round *Ligaments* of the *Uterus* hanging down.

G, The Cavity of the *Fundus Uteri*.

H, The Cavity of the *Cervix* and its fibrous substance.

II, The internal proper Membrane of the *Uterus*.

K, The mouth of the *Uterus*.

L, The freightning of the neck of the *Womb*.

FIG. IV.

Shews the *Testicle* or *Ovarium* of a *Woman*.

A, The *Testicle* open'd length ways in the lower part.

BB, The *Ova* of different sizes kept within the Membranous substance of the *Testicles*.

CC, Blood Vessels in the middle of the *Testicles*, as they come

come in great Numbers, from its upper part to the Eggs.

DD, The Ligament of the Testicles cut off, by which they are joyn'd to the *Uterus*.

FIG. V.

Shews the place that contains the Eggs, in the *Ovarium* of an Ewe, or female Sheep.

A, The glandulous substance of the *Globuli* open'd.

B, The place from whence the Egg was taken out.

C, The Egg taken out of it.

FIG. VI.

The Testicle of a Rabbet, in which the *papillæ* of the *folliculi* are delineated as they appear the second day after Coition.

FIG. VII.

Another Testicle of the same Creature, in which the thickness and cavities of the *folliculi* appear the third day from Coition, in which the Eggs lay hid.

FIG. VIII.

Shews the Womb open'd by an Incision of the forepart.

AA, The parts of the *Uterus* cut a-cross, and so order'd that its cavity and the thickness of its spongy sides may be seen.

B, The Cavity of the bottom of the *Uterus*.

C, The Cavity of the neck of the *Uterus*.

D, The streightness between the Cavities of the bottom and neck very conspicuous.

E, The mouth of the *Uterus*.

F, The part of the *Vagina* cleaving to the mouth of the *Uterus*.

GG, Part of the Tubes.

HH, Probes inserted by the Tubes into the bottom of the *Uterus*.

II, The proper Membrane of the *Uterus* covering its inward substance.

KK, The interior Membrane of the neck of the *Uterus* less spongy.

T A B. XXXVI

Fig. i. from De Graaf, the rest from Hoboken and Bidloo.

FIG. I.

AN Abortive of three months with its secundines.

A, The Fetus.

B, Its Navel.

CC, The inequalities or knots of its Navel-string.

DD, Two parts of the Membrane call'd *Amnios* expanded.

EE, Parts



BBBB, The Arteries.
 C, The Chæra.
 D, The Urinary Membrane.
 E, The Vena that goes with the Arteries.

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A. A view of three months
with its membranes.
A, The Fetus

CC, The inequalities of
of its Navel-string.
D.D, Two parts of the Mem-
brane call'd Wombs expanded.
E.E, Parts

EE, Part of the Membrane called *Chorion* expanded.

FF, Part of the *Amnios* and *Chorion* sticking together.

G, Parts of *Allantois* separated from the *Amnios* and laid bare.

HH, That Part of the *Allantois* or *Urinary* Membrane blowed up which lies under the *Amnios*.

I, The insertion of the *Navel* string into the *Placenta*.

KK, Part of the *Placenta*.

LL, Part of the *Placenta* separated, that its Blood Vessels may be seen.

MM, The hinder part of the *Chorion*, from, whence the branches of the vessels of the *Placenta* go like the branches of Trees, before they insinuate themselves into the pores of the *Uterus*.

FIG. IX.

The surface of the *secundines* of a *Fetus* next the *Uterus*.

AA, The *Placenta Uterina*.

BBBB, The *Chorion*.

CCCC, The *Amnios*.

D, A part of the *Navel* string.

FIG. III.

The surface of the *secundines* next the *Fetus*.

AAA, The internal surface of the *Placenta* next the *Fetus*.

BBBB, The *Amnios*.

C, The *Chorion*.

D, The *Urinary* Membrane cut off.

EE, The *Navel* string.

FF, The knots of its Vessels.

G, That part of the *Navel* string next the *Fetus*.

H, A distribution of the Vessels into the *Placenta*.

FIG. IV.

AAA, Parts of the *Navel* string.

BB, The *Arteries* with their knots.

CCC, One of 'em open.

D, The *Umbilical* Vein.

FIG. V.

Shews the *Navel* string dissected transversly, and view'd thro' a Microscope.

AA, The *Navel* string dissected in the middle.

B, the *Umbilical* Vein.

CC, The two *Umbilical* Arteries.

dd, *Divers* *Ducts* containing the *succus Nutritivus*.

EE, The *Fibres*.

F, The *Urachus* between the two Arteries.

FIG. VI.

Another part of the *Navel*-string in which its Vessels being filled with Wax their turnings may be partly seen.

A, Part of the *Navel*-string.

B, The turnings of both *Arteries* which have little knots on both sides.

C, The Vein that goes with the *Arteries*.

T A B. XXXVII.

From Bidloo.

FIG. I.

THe *Papilla* and *Areola* of a Womans Breast exprest by the assistance of a *Microscope*.

A, The head or top of the *Nipple*.

B, Its Glandulous Membrane.

C, The mouths of the Milk Vessels.

DD, The *Areola*.

E, Its rough Membrane.

FFF, Divers *Papillary* Protuberances from each of which a Hair proceeds.

GG, Some *Vestigia* of the *Lactiferous* Tubes in their progress from the *Mamma* to the *Papilla*, A, B, C.

FIG. II.

The *Papilla* it self with its Milk-vessels magnified.

AA, The external Glandulous Membrane of the *Papilla* separated from it.

BB, Divers Glands of the *Papilla* cleaving to this Membrane.

CC, The *Lactiferous* Tubes with arise from the extremities of the Arteries within the *Mamma*, and discharge their Contents at their Orifices in the top of the *Papilla*, C. Fig. 1.

DD, The Glands of the *Papilla*, whose secretory Ducts discharge themselves into the *Lactiferous* Tubes.

FIG. III.

The back part of the *Areola* that was divided from the Breast.

AA, The Circumference of the *Areola*.

BB, The *Mammary* Glands.

CC, The *Lactiferous* Tubes in their way to the *Nipple*.

FIG. IV.

Shews a *Hair* delineated by a *Microscope*.

AA, The *Hair* above the skin which seems to be compos'd of divers bony Globular Bodies.

B, Part of the *Cuticula* which adheres to the *Hair*.

C, The root of the *Hair* within the Skin.

ddd, The *Fibrilla*, or branches which grow out of the *Hair*.

FIG. V.

A Woman's Breast dissected.

AA, The *Skin* rais'd and pinn'd out.

B, The *Skin* partly remaining on it.

C, The *Nipple*, or *Papilla*.

DD, The *Areola*.

EE, The Glands of the Breast.

FF, The *Lactiferous* Tubes and Blood Vessels in the interstices of the Glands.

GG, The

TAB. XXXVII.

fig: 5.



fig: 6



fig: 7



fig: 2.



fig: 1.

fig: 3.

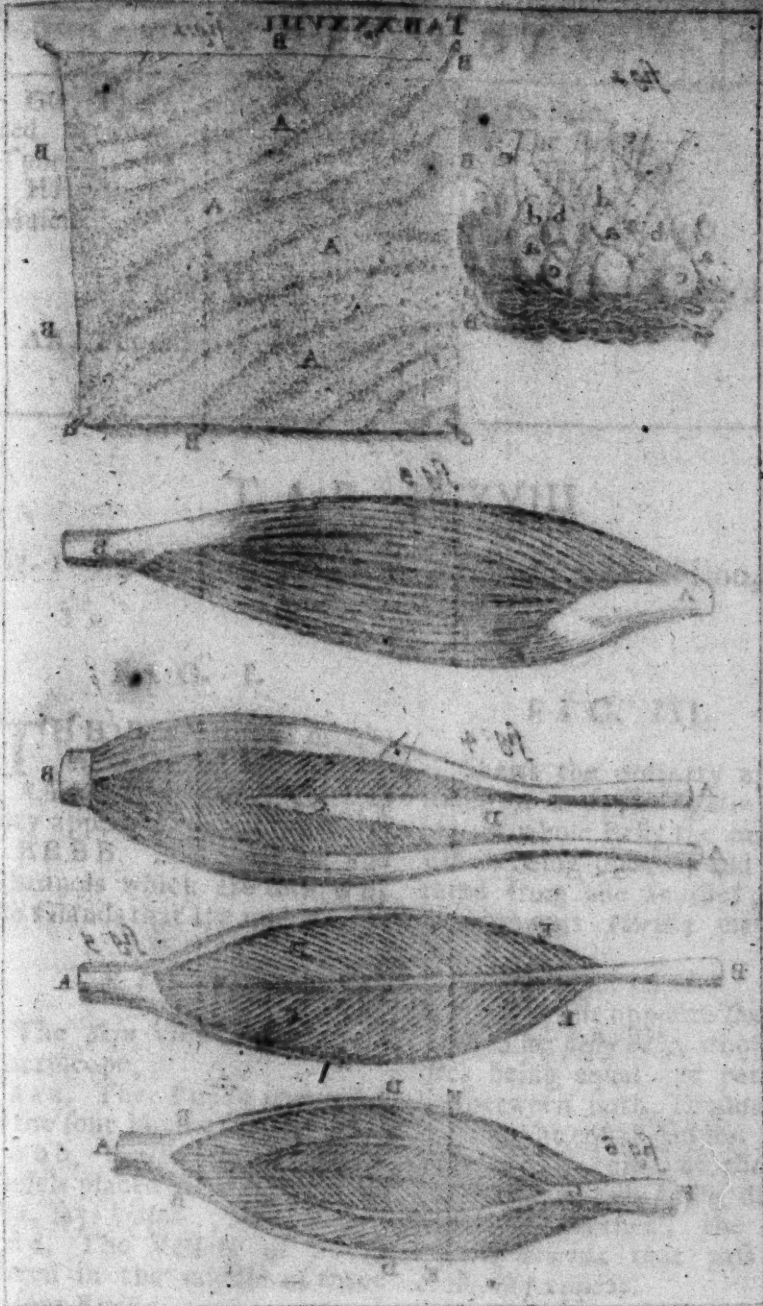


PLATE XXXIII
MUSCLES OF THE THROAT
A. Thyroideus
B. Sternohyoideus
C. Sternothyroideus
D. Thyroideus
E. Sternohyoideus
F. Sternothyroideus
G. Thyroideus
H. Sternohyoideus
I. Sternothyroideus
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Q. Sternohyoideus
R. Sternothyroideus
S. Thyroideus
T. Sternohyoideus
U. Sternothyroideus
V. Thyroideus
W. Sternohyoideus
X. Sternothyroideus
Y. Thyroideus
Z. Sternohyoideus

TAB. XXXVIII. *Fig. 2*



Fig. 3



Fig. 4



GG, The Adipose Ducts, placed between the lactiferous Tubes.

HH, Part of the Pectoral Muscle.

B, Its Skin.

C, The Papilla.

DD, The Areola.

FIG. VII.

FIG. VI.

AA, The Mamma of a Man.

AA, A Hair magnify'd by a Microscope.

T A B. XXXVIII.

Fig. 1. is Blancard's (as he says). 2. from Bidloo, the rest from Dr. Willis.

FIG. I.

THE Delineation of the Cuticula by a Microscope.

AAAA, The Sweat Pores as they appear by a Microscope.

BBBB, The Furrows and Channels which are form'd by the Glands that lye under.

FIG. II.

The Skin view'd through a Microscope.

aaa, The Papilla compos'd of the four kinds of Vessels.

bbb, Capillaments of watery Vessels placed between the Papilla, says Bidloo.

dd, The Vessels of Sweat placed in the middle of three or four Papilla.

ee. The Hairs arising at the sides of the Pores of the Sweat-Vessels, having colateral Branches.

FIG. III.

Shews the ordinary appearance of a simple regular Muscle, in whose Belly the carnos Fibres being opened, and separated from one another, the membranous Fibrilla may be seen.

A, The right Tendon.

B, The left opposite Tendon.

C, The fleshy Belly, whose Fibres being equal and parallel, lie between both Tendons at oblique but equal Angles.

D, The opening of the carnos Fibres, which being drawn from one another, the membranous Fibrilla that pass the cross-way appear.

FIG. IV.

Shews a simple Muscle, after the Tendon is cut off, and some part

part separated from it, and cut in the middle that the *interior Series* of the *carnous Fibres*, and their joyning with the *Tendons*, may appear.

A A, The *right Tendon* placed above, both parts of which being divided, appear.

B, The *left opposite Tendon*, which being divided, the *Fibres* only are seen upon the edge, the rest lying very much under the *Flesh*.

C, Part of the *carnous Belly* divided and separated, in which all the equal *carnous Fibres* proceed in the same oblique Order from one *Tendon* to the other.

D, Some *membranous Fibrille* that cross the fleshy ones very thick, scarce express'd in this Figure.

FIG. V.

Shews a Muscle not much compounded.

A, The *exterior compound Tendon* inclosing the *Flesh* on both sides, which being divided, little more than the edges of it are here seen.

B, The *interior compound Tendon*, passing through the middle of the *Flesh*, which receives the *carnous Fibres*, sent from both sides of the *exterior Tendon*.

C, The *first Belly* of the *carnous Fibres*, whose *Fibres* being all equal and parallel, lie between the sides of the *Ten-*

dons that are opposite, at oblique and equal Angles.

D, The *second belly* of the fleshy fibres, which being made after the same manner with the former, go the same way with them.

EE, Both the extremities of the *exterior compound tendon*.

F, The Extremity of the *internal compound tendon*.

FIG. VI.

Shews the *regular compound Muscle*, divided in the middle and opened, so that the parts of both Bellies may be seen within side.

A, The *compound exterior Tendon* divided into four parts.

BB, Parts of one side of the divided *Tendon*, separated from one another.

C, Parts of the other side of the *Tendon*, likewise divided and laid by each other, which lie very much under the *flesh*.

DD, The *Flesh* of the one *Belly* divided and separated from the other.

EE, the *Flesh* of the other *Belly* divided and laid by.

F, The *interior compound Tendon* passing through the middle of the *flesh*.

GG, Parts of the same *Tendon* divided from one another, with the *Fibres* of that *Belly* of the Muscle that joins with them.

T A B.



THE Lower Jaw, and the Genæ is taken off.

M. E. This is a figure taken from the dissection by Mr. Cowley, my, Tab. 12.

a. This circular Flap of the Nose (Nasæ) is fictitious, but such a dissection by Subject is smiling the figure of these parts may be seen in Placemine and others.

b. A Musculus renders it the Ala Nasæ. Elevating Ala nasæ, the figure of the Ala and this Musculus the fleshy frequently coarcted with the Ala Nasæ.

c. The Musculus proprius. The Granular Petrosus. This is a thin fleshy Musculus, circularly covering the Eye-lids, to which it is inserted not unlike the Orbicularis.

each other, drawing the Muscles.

and Gland, and the Muscles.

the lower jaw, and left at its insertion at the angle of the Jaw. It may be seen, that it is the same as the lower jaw, the same.

from the lower jaw, and left at its insertion at the angle of the Jaw. It may be seen, that it is the same as the lower jaw, the same.

TAB. XXXIX.



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T A B. XXXIX.

All from Bidloo.

FIG. I.

THE Muscles of the Lips, and some of those of the Lower Jaw, after the *Quadratus Genæ* is taken off.

N. B. That these, and most other Figures taken from Bidloo, we shall follow the Descriptions given them by Mr. Cowper. See his *Anatomy*, Tab. 12.

a, This formal appearance of circular Fibres, about the *Ala Nasi* (says he) I suspect to be fictitious, having never observ'd such a disposition of them in any Subject, after purposely examining this Part; yet the like Figure of these Fibres may be seen in *Placentinus* and others.

b, A Muscle whose Position renders it capable of pulling up the *Ala Nasi*, whence its call'd *Elevator Ala Nasi*, and by *Placentinus*, *Pyramidalis*, from its Figure; nor do we commonly find this Muscle in Dissection; the fleshy Fibres of this Part, frequently taking the same course with those of the *Orbicularis Palpebrarum*, do pass by the *Ala Nasi*.

c, The *Musculus elevator Labii superioris proprius*.

n, The *Orbicularis Palpebrarum*. This is a thin fleshy Muscle, circularly environing the Eye-lids, to which it is inserted not unlike the *Sphincter* Muscle

of other Parts, as of the Lips and Bladder of Urin: It acts in drawing the Eye-lids nearer each other, which we call shutting the Eye-lids. But if this Muscle acts vigorously, it not only draws the Eye-lids close together, but forces the Bulb of the Eye into the Orbit.

Note, n in this Fig. as in that of Bidloo, by mistake is placed on the Temporal Muscle.

o, The *Musculus Masseter in situ*.

p, Part of the *Buccinator*, covered with Fat.

l, The Parotid Gland, part of which being cut away to shew the *Masseter*.

k, m, n, The Temporal Muscle, k n its outside, m its inside next the Skull turn'd down.

Besides these Letters of Reference, Mr. Cowper adds five more, which are not taken notice of, either by *Blancard* or *Bidloo*.

FIG. II.

Exhibits the Muscles of the Lips, and some of those of the Lower-Jaw.

a, b, c, The *Musculus Buccinator*, freed from its Origin at the *Processus Coronæ* of the Lower-Jaw, and left at its Insertion at the angle of the Lips. Here we may observe, that in this Figure, as in the Life, the Fibres

k 2

of

of this Muscle run according to its length, contrary to the Description Bidloo and others give of it. The *Ductus Salivaris* of the Parotid Gland, passes thro' this Muscle into the Mouth.

d, The *Musculus elevator Labiorum communis*.

e, The *Elevator Labii superioris proprius*, and *Musculus Dilatator Alae nasi*.

f, The *Zygomaticus*.

g, The *Depressor Labiorum communis*.

h, The *Depressor Labii inferioris proprius*.

i, The *Constrictor*, or *Sphincter Labiorum*.

k, m, The *Temporalis*.

n, The *Processus condyliformis* of the Lower-Jaw, which is in a great part laid bare.

To this Figure also divers other References are added by Mr. Comper.

FIG. III.

Divers Muscles of the Tongue, *Os Hyoides* and *Larynx*, as they appear in their proper Situation after the side of the Lower-Jaw is taken off.

aab, The Tongue pinn'd up.

c, The *Styloglossus*.

d, The *Ceratoglossus*, by Bidloo mistaken for *Basioglossus*.

e, f, The *Genioglossus*.

g, The *Basis* of the *Os Hyoides*.

h, Part of the *Fauces*, contiguous to the root of the Tongue which Bidloo and Blancard erroneously call the *Musculus Ceratoglossus*.

i, Part of the *Genioglossus*.

k, The *Sternohyoideus*.

l, Part of the *Coracohyoideus*.

Note, That l (according to the Original of Bidloo) is here placed on different Parts of this Figure, but the lowermost belongs to the last Reference.

m, The *Musculus Stylohyoideus*.

n, The *Mylohyoideus*, left at its Insertion to the *Os Hyoides*.

o, The *Geniohyoideus in situ*.

FIG. IV.

Divers Muscles of the Lower Jaw and *Os Hyoides in situ*, after the Skin, with the *Musculus Quadratus Colli*, are removed.

a, b, c, The *Musculus Digastricus*; b, its fleshy origin from the *Processus Mammillaris*; c, its middle Tendon passing through the *Musculus Stylohyoideus*, and an Annular Ligament fastned to the *Hyois*, before it is implanted into the Lower-Jaw, dd.

dd, The under part of the Lower Jaw-bone next the Chin.

ee, The *Mylohyoideus*.

ff, The *Sternohyoidei*.

gg, Parts of the *Coracohyoidei*.

hh, Parts of the *Sternohyoidei*.

H, The *Mastoideus*.

For the rest of the Parts of this Figure, we must refer to Mr. Comper's Explication, the most significant not being letter'd by Bidloo or Blancard.

FIG. V.

Divers Muscles lying under those express'd in the preceeding Figure,

aa, The

aa, The lower edge of the inferior Jaw-bone bared.

bb, Parts of the *Musculi Sternohyoidei* hanging down from their Originals.

c, The *Coracohyoideus*.

d, Part of the *Musculus Stylohyoides*, at its Termination in the *Os Hyoides*.

e, The *Glandula sublingualis* lying immediately under the *Musculus Mylohyoides*.

f, The *Geniohyoides*.

gg, The Digastrick Muscles of the Lower Jaw cut from their Insertions.

hh, The *Musculi Mastoidei*, that of the right side remaining *in situ*; the left being cut off from its Original.

i, The Scutiform Cartilage of the *Larynx*, which makes what is call'd the *Pomum Adami*.

k, The Wind-pipe.

ll, The *Glandula Thyroidea*.

There are no less than ten considerable Parts not taken notice of in this Figure, either by *Bidloo* or *Blancard*; of which you may see an Account of in *Mr. Cowper's Explications*, Tab. 15.

FIG. VI.

The Ramifications of the *Ductus Salivalis* injected with Wax, and freed from the Parotid Gland,

a, The Trunk cut off as it passes over the *Musculus Masseter*.

b, c, d, e, f, The Ramifications of the Salival Duct freed from the Gland,

FIG. VII.

A, The *Musculus Attollens Auriculam*.

B, CC, The *Retrabens Auriculam*.

aa, The External Margin of the outward Ear, call'd *Helix* and *Capreolus*.

BB, The *Antbelix Auriculae*.

D, The *Tragus Auriculae*, below which is the *Labrus*.

DD, Below the upper D, shews part of the Parotid Gland.

EE, The Ramifications of its excretory Ducts.

G, The Trunk of its excretory or salival Duct cut off.

FIG. VIII.

Represents, according to *Bidloo*, the Salival Ducts freed from the inferior Maxillary Gland, express'd *in situ* in *Fig. 4.* of this Table, but not letter'd nor taken any notice of by either of these Writers. This Figure, like some others published by *Bidloo*, was done from Invention, and is censur'd in *Mr. Cowper's Explications*; however he adds *Bidloo's Account* of it as follows.

A, The twigs of the Salival Ducts injected with Wax, and freed from the Glandules; B, the larger Branches; C, their common Duct; D, its Orifice enclos'd with an edging; E, part of the Investing Membrane of the Mouth cut off. See *Fig. 19.* of *Mr. Cowper's Appendix*.

T A B.

of this Muscle run according to its length, contrary to the Description Bidloo and others give of it. The *Ductus Salivaris* of the Parotid Gland, passes thro' this Muscle into the Mouth.

d, The *Musculus elevator Labiorum communis*.

e, The *Elevator Labii superioris proprius*, and *Musculus Dilator Alæ nasi*.

f, The *Zygomaticus*.

g, The *Depressor Labiorum communis*.

h, The *Depressor Labii inferioris proprius*.

i, The *Constrictor*, or *Sphincter Labiorum*.

k, m, The *Temporalis*.

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d, The *Ceratoglossus*, by Bidloo mistaken for *Basioglossus*.

e, f, The *Genioglossus*.

g, The *Basis* of the *Os Hyoides*.

h, Part of the *Fauces*, contiguous to the root of the Tongue which Bidloo and Blancard erroneously call the *Musculus Ceratoglossus*.

i, Part of the *Genioglossus*.

k, The *Sternohyoideus*.

l, Part of the *Coracohyoideus*.

Note, That l (according to the Original of Bidloo) is here placed on different Parts of this Figure, but the lowermost belongs to the last Reference.

m, The *Musculus Stylohyoideus*.

n, The *Mylohyoideus*, left at its Insertion to the *Os Hyoides*.

o, The *Geniohyoideus in situ*.

FIG. IV.

Divers Muscles of the Lower Jaw and *Os Hyoides in situ*, after the Skin, with the *Musculus Quadratus Colli*, are removed.

a, b, c, The *Musculus Digastricus*; b, its fleshy origin from the *Processus Mammillaris*; c, its middle Tendon passing through the *Musculus Stylohyoideus*, and an Annular Ligament fastned to the *Hyoid*, before it is implanted into the Lower-Jaw, dd.

dd, The under part of the Lower Jaw-bone next the Chin.

ee, The *Mylohyoideus*.

ff, The *Sternohyoidei*.

gg, Parts of the *Coracohyoidei*.

hh, Parts of the *Sternohyoidei*.

H, The *Mastoides*.

For the rest of the Parts of this Figure, we must refer to Mr. Cowper's Explication, the most significant not being letter'd by Bidloo or Blancard.

FIG. V.

Divers Muscles lying under those express'd in the preceeding Figure,

aa, The

aa, The lower edge of the inferior Jaw-bone bared.

bb, Parts of the *Musculi Sternohyoidei* hanging down from their Originals.

c, The *Coracohyoideus*.

d, Part of the *Musculus Stylohyoideus*, at its Termination in the *Os Hyoides*.

e, The *Glandula sublingualis* lying immediately under the *Musculus Mylohyoideus*.

f, The *Geniohyoideus*.

gg, The Digastrick Muscles of the Lower Jaw cut from their Insertions.

hh, The *Musculi Mastoidei*, that of the right side remaining *in situ*; the left being cut off from its Original.

i, The Scutiform Cartilage of the *Larynx*, which makes what is call'd the *Pomum Adami*.

k, The Wind-pipe.

ll, The *Glandula Thyroidea*.

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b, c, d, e, f, The Ramifications of the Salival Duct freed from the Gland,

FIG. VII.

A, The *Musculus Attollens Auriculam*.

B, CC, The *Retrabens Auriculam*.

aa, The External Margin of the outward Ear, call'd *Helix* and *Capreolus*.

BB, The *Anthelix Auriculae*.

D, The *Tragus Auriculae*, below which is the *Labrus*.

DD, Below the upper D, shews part of the Parotid Gland.

EE, The Ramifications of its excretory Ducts.

G, The Trunk of its excretory or salival Duct cut off.

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A, The twigs of the Salival Ducts injected with Wax, and freed from the Glandules; B, the larger Branches; C, their common Duct; D, its Orifice enclos'd with an edging; E, part of the Investing Membrane of the Mouth cut off. See *Fig. 19.* of *Mr. Cowper's Appendix*.

T A B.

T A B. XL.

From Bidloo.

FIG. I.

Shews divers Muscles employ'd in the Motion of the Head, after the upper part of the *Circularis* is remov'd.

a, b, d, The *Musculus Splenius in situ* on the left side.

e, The *Splenius* rais'd to shew.

f, g, h, The *Complexus*.

ii, The *Os Occipitis*.

aa, The *Musculi Longi colli*.
bb, The three *Scaleni in situ*.
i, The *Mastoideus in situ*.
l, The same rais'd from its Originals.
kk, Its several beginnings.
l, The *Flexores Capitis in situ*.
See the Original in Bidloo.

FIG. II.

The Muscles which appear under the former.

a, The *Rectus major posticus*, hanging down.

b, The same *in situ*.

cc, The *Os Occipitis*.

e, The *Recti minoris* lying under the *maiores*.

f, The *Obliquus inferior*.

g, The *Obliquus superior*.

h, The same turn'd off from the other side.

i, The *Complexus* rais'd.

m, n, The *Spinales Colli*.

FIG. III.

Divers Muscles of the Head and Neck, which appear in the fore-part, after the Lower-Jaw, Tongue, *Larynx*, *Aspera Arteria* and *Gula* are removed.

FIG. IV.

Divers Muscles that appear in the superior and fore-part of the Trunk.

a, The *Sternum*.

b, The *Musculus subclavius*.

c, The Cartilaginous ending of the first Rib.

dd, The *Serratus major Anticus*.

ee, Its Indentations with the *Obliquus descendens*.

ff, The *Serratus major Anticus* rais'd.

g, The *Obliquus descendens*.

h, The *Pectoralis*.

i, The same rais'd.

k, The *Serratus minor Anticus* rais'd.

The rest of the Muscles express'd in these Figures cannot be referred to for want of Characters placed on them in the Prints, all which are supplied by Mr. Cowper in his Explanations.

T A B.

TAB. XL.





Divers Muscles of the Trunk, which appear in the superior and fore-part of the Trunk.

Divers Muscles that appear in the superior and fore-part of the Trunk.

TAB. XLII.

fig: 1.



fig: 2.



fig: 3.



fig: 4.



fig: 5.



fig: 6.



T A B. XLI.

From Bidloo.

FIG. I.

- aa, **T**HE *Trapezius* or *Cu-*
cularis on both sides.
 bb, c, dd, f, g, The several
 Orders of its Fibres, as expref-
 sed in the Figure.
 ii, The *latissimus dorsi*, or *A-*
niscalptor in situ.
 ll, Part of the *obliquus descen-*
dens on both sides.
 m, The *Infraspinatus*.
 h, n, The *basis* of the *Scapula*.
 oo, The Tendon of the *La-*
tissimus dorsi.

FIG. II.

- a, The *Rhomboides in situ*.
 b, c, Its Origin.
 d, Its Termination.
 e, The same separated.
 f, i, The *Serratus superior po-*
sticus.
 g, Part of the *levator scapula*.
 h, Its ending.
 k, The *Serratus posticus infe-*
rior.
 l, The *Deltoides*.
 m, The *Aniscalptor*.
 n, The *Sacrolumbus*.
 o, The *longissimus dorsi*.
 p, The *Semispinatus*.
 q, r, The *Sacer*.

FIG. III.

- a, The *Sacrolumbus*.
 b, The *Longissimus dorsi*.
 c, The *Semispinatus*.

FIG. IV.

- a, The *Sacer*.
 b, The *Quadratus Lumborum*.
 c, The *Sacrolumbus*.
 d, The *Longissimus dorsi*.
 e, The *Semispinatus*.
 f, The *Ribs*.

FIG. V.

- aa, The *obliquus descendens* of
 the *Abdomen* out of its proper
 place.
 bbb, Its first Connexion.
 cc, Its second and third
 from the Spines of the *Os Ilion*.
 ee, The ending of its Fibres.
 ff, Its Tendon cut off about
 the *linea Alba*.
 g, Its membranous and ten-
 dinous insertion into the *Os pu-*
bis.
 h, The *Ribs* that appear.
 i, The *obliquus ascendens*.
 k, Its ascending Fibres.
 ll, m, n, The *Rectus* in its
 place.
 oooo, Its tendinous Sections.
 pp, The other *Rectus* remov'd
 out of its proper place.

qq, The *Musculi Pyramidales*.
 r, The *Transversalis*.
 ss, Its Tendon cut off.
 ttt, The Intestines appearing under the *Peritoneum*.
 vv, The Mammary and Hypogastrick Veins and Arteries.

FIG. VI.

Shews the Cavity of the *Abdomen*, after its *Viscera* are taken out.

aaaa, The Muscles of the *Abdomen* cut off.

bb, The Diaphragm, in its natural situation, as it appears next the *Abdomen*.

c, The *Foramen*, thro' which the *Vena cava* goes to the Heart.

d, The *Foramen*, thro' which the *Æsophagus* passes.

e, The Trunk of the great Artery cut off, passing thro' the *Foramen* of the Diaphragm.

f, Part of the upper Muscle of the Diaphragm.

g, Part of the lower Muscle of the Diaphragm.

h, Its two Tendons on the *Vertebra* of the Loyns.

i, The *Vertebra* of the Loyns.

kk, The *Psoas*, or *Musculus lumbaris*.

ll, The same, partly separated from the *Vertebra* and pin'd out.

m, The *Quadratus*.

n, The *Iliacus internus*.

o, The *Pectineus*, which is call'd *lividus*.

pp, The *Triceps*.

T A B. XLII.

From Bidloo.

FIG. I.

aaa, THE Skin freed from the Muscles.

b, The internal Tubercle of the *Os Humeri*.

c, The tendinous expansion of the *Pulmaris longus*.

d, The *Biceps*.

e, The *Pronator Radii Teres*, obscurely exprest.

f, g, The long Tendon of the *Palmaris*.

h, k, The transverse Ligament of the *Carpus*.

i, The *Abductor pollicis*.

l, The Thumb.

m, n, o, p, The four Fingers.

FIG. II.

a, c, The *Musculus Deltoides*, rais'd from its Original.

b, The *Clavicula*.

d, The *Pectoralis*.

e, The *Subscapularis*.

f, The *Coracobrachialis*.

g, The *Biceps*.

h, The *Rotundus major*.

FIG.

TAB. XLII.



Specimen of his Skill & Art. The Finish.
 was: his Maker still stand. In the latter Argument
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 operation of this Figure, than as at, & in London, pallis, &
 the

THE HAT



a, The long Tendon of the
 b, The long Tendon of the
 c, The long Tendon of the
 d, The long Tendon of the
 e, The long Tendon of the
 f, The long Tendon of the
 g, The long Tendon of the
 h, The long Tendon of the
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 u, The long Tendon of the
 v, The long Tendon of the
 w, The long Tendon of the
 x, The long Tendon of the
 y, The long Tendon of the
 z, The long Tendon of the

FIG.

FIG. III.

- a, The *Biceps* drawn off its subjacent Muscles.
- b, The *Brachialis internus*.
- c, d, e, The *Gemellus*.
- f, The *Rotundus major*.
- g, The *Supraspinatus*.
- xx, The *Deltoides*.

FIG. IV.

- a, The *Perforatus*.
- b, Its Tendons.
- c, The *Perforans*.
- ddd, Its four Tendons which pass through the Fissures (ee) of those of the former Muscles.
- ee, The Cases in which they are all enclosed.
- ff, The *Lumbricales*.

FIG. V.

- a, The *Perforatus*.
- b, The *Perforans*.
- ccc, The *Lumbricales*.
- dd, The *Interossei*.
- e, The Fore-finger.
- f, The Little Finger.
- g, The Thumb.
- h, The *Abductor Indicis*.
- i, k, The *Abductor minimi digiti*.
- l, *Flexor pollicis longus*.
- p, m, o, *Flexor primi & secundi ossis pollicis*.
- n, The *Abductor*, and part of the *Flexor secundi internodii Pollicis* rais'd together.

Thus far *Blancard*; Here is a Specimen of his Skill in Anatomy; his Master *Bidloo* could not go any farther with the Explanation of this Figure than as

above: But the Graver seeing other things express'd in the Figure as remarkable as those that were letter'd, thought he should put Letters on the rest too; which when he had done, *Blancard* could give no more account of, than *Bidloo* had done before him; which are as follows.

- q, The *Biceps*.
- r, The *Supinator Radii brevis*.
- s, The *Pronator Radii teres*.
- t, The *Pronator Radii quadratus*.
- v, The *Supinator Radii longus*.
- x, The *Flexor Carpi Radialis*.
- y, The Ligament between the *Ulna* and *Radius*.
- z, The *Ulnaris Carpi Flexor*.

FIG. VI.

- a, The Skin separated and hanging by.
- b, The Elbow or *Olecranon* by *Bidloo* and *Blancard* call'd the External *Apophysis* of the *Os Humeri*, and
- c, placed on the *Extensor Carpi radialis*, which they call the Internal *Apophysis* of the *Os Humeri*;
- f, d, is also placed on the same *Extensor Carpi radialis*.
- g, The *Extensor digitorum communis*.
- e, The *Extensor Carpi Ulnaris*;
- kk, i, Are placed confusedly in this Figure.

FIG. VII.

- a, The Fore Finger.
- b, The Little Finger.
- c, The Thumb.
- d, The *Extensor digitorum communis*.
- ee, f, Its Tendons passing to the

the first and second Bones of the Fingers here supported.

N. B. The *Radialis extensor* is supported with a String.

FIG. VIII.

- a, The *Radius*.
- b, The *Ulna*.
- c, The upper end of the *Radius*.
- d, The Ligament joyning the *Ulna* and *Radius*.
- e, The *Musculus Ulnaris extensor*.

- f, i, The *Radialis extensor*.
- g, The *Supinator Radii brevis*.
- hh, Part of the *Extensor communis digitorum*.
- k, The *Extensor minimi digiti proprius*, exprest three times bigger than it ought.
- m, The *Carpus*.
- nnnn, The Bones of the *Metacarpus*.
- l, o, The *Extensores primi, secundi & tertii Internodii pollicis*.
- qq, Part of the *Extensor communis digitorum*, together with the *Indicator*.

T A B. XLIII.

From Bidloo.

FIG. I.

- a, THE *Glutæus major* rais'd.
- b, The inequalities of its Fibres.
- c, Its implantation into the *Trochanter*.
- d, The *Glutæus medius*.
- e, The *Trochanter major*, in which the *Glutæus medius* is implanted.
- f, A Ligament between the *Os sacrum* and *Ischium*.
- g, The knob of the *Ischium*.

FIG. II.

- a, The *Glutæus major* rais'd.
- b, The *Medius* also rais'd.

- c, The *Minor*.
- d, g, i, The *Iliacus externus*, or *Pyriiformis* rais'd.
- e, The end of the *Os sacrum*.
- h, Part of the *Marfupialis*.

FIG. III.

- b, The *Glutæus Medius*.
- c, The *Minor*.
- d, The *Iliacus externus*, or *Pyriiformis* rais'd.
- e, Part of the *Vastus externus*.
- f, The *Marfupialis*.
- g, Its *Marfupium*.
- i, The head of the Thigh-bone
- k, The *Os ilion*.
- l, The *Os sacrum*.
- m, The *Os Ischium*.

FIG.



III. RAT

the first and second bones of
the finger. The first is
supported by the

The second bone of the
finger. The first is
supported by the

The Ulna.

The upper end of the

The first bone of the Me-

The first bone of the Me-

Part of the

Part of the

Part of the



From Below

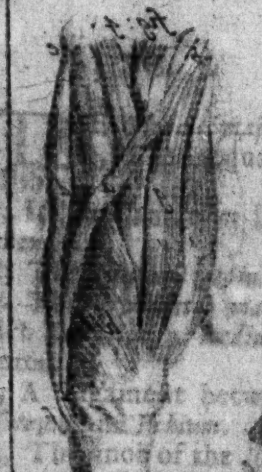


FIG. 16.

- a. The Clavus major ratis d.
- b. The Medius alio ratis d.

- c. The Os ilion.
- d. The Os sacrum.
- e. The Os pubis.

FIG.



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FIG. IV.

- a, The *Sartorius longus*.
- b, Its Origin from the Tubercle of the *Os Ilion*.
- c, Its insertion into the *Tibia*.
- d, The *Gracilis*.
- e, Its beginning from the *Os pubis*.
- f, Its ending in the *Tibia*.
- g, The *Rectus*.
- h, The *Vastus internus*.
- i, The *Vastus externus*.

FIG. V.

- a, The *Musculus membranosus*.
- b, Its broad Tendon, enclosing all the Muscles of the Thigh.
- c, The *Musculus crureus*.
- d, The *Sartorius longus* hanging down, with
- e, The *Gracilis*, and
- f, The *Rectus*, and
- g, The *Vastus internus*, and
- h, The *Vastus externus*.
- i, The *Triceps*.

k, The *Psoas*, or part of the *Musculus Lumbaris*.

FIG. VI.

- a, The *Biceps*.
- b, Its two Heads.
- c, Its ending.
- d, The *Seminembranosus*.
- e, The *Seminervosus*.
- f, The *Glutæus magnus*.
- g, The *Medius*.
- h, The back part of the Thigh-bone.

FIG. VII.

- a, The *Glutæus major*.
- b, The *Biceps*.
- c, The *Seminembranosus*.
- d, The *Seminervosus*.
- e, The Thigh-bone bared.
- f, Parts of the Muscles of the *Tibia*.

FIG. VIII.

- aa, The Thigh-bone laid bare.
- b, The *Musculus crureus*.
- c, The *Patella*.
- d, Its inclosure.

T A B. XLIV.

From Bidloo.

FIG. I.

- a, **T**HE *Patella*.
- b, The Tendons of the *Musculi Peronei*.
- c, The *Malleolus externus*.
- d, The *Tibialis Anticus*.
- e, The *Peronæus longus*.
- f, The *Extensor digitorum pedis longus*.
- g, The Tendons on the top of the Foot.
- h, Part of the Tendon of the *Extensor pollicis*.
- i, Part of the *Gastrocnemius externus*.

FIG. II.

- a, The superior *Apophyse* of the *Tibia*.

1 2 b, The

b, The upper *Appendix* of the *Fibula*.

c, The Body of the *Tibia*.

d, The Heel.

e, The *Musculus Tibialis Anticus*.

f, The *Extensor digitorum longus*.

g, The *Extensor brevis*.

h, The *Extensor pollicis pedis longus*.

i, *Peronæus longus in situ*.

k, The Skin of the Bottom of the Foot.

l, The *Stilus*, which supports the Tendons on the Foot.

FIG. III.

a, The *Tibialis Anticus*.

c, The *Peronæus secundus*, or *Semifibulaus*.

b, The *Peronæus primus* or *Fibulaus*.

d, The *Extensor digitorum pedis longus*.

e, Its Tendons near their Insertions.

f, *Extensor digitorum pedis brevis*.

g, *Extensor pollicis longus*.

m, *Extensor brevis*.

h, The *Tibia*.

i, The *Fibula*.

k, The Bones of the *Tarsus*.

ll, The *Musculi interossei*.

o, Part of the *Gastrocnemius internus*.

FIG. IV.

a, The upper part of the *Tibia*.

b, Its middle.

c, The Heel.

d, Part of the *Musculus Popliteus* at its insertion.

ee, The *Gastrocnemius externus*.

f, The Tendinous expansion of the *Musculus Plantaris*, freed from the bottom of the Foot and expanded; but here expressed too large.

g, The *Musculus Perforatus*, and Tendons of the *Perforans* on the bottom of the Foot.

h, The little Toe.

i, The great Toe.

FIG. V.

aa, Two Protuberances of the inferior *Appendix* of the Thigh-bone.

b, The upper part of the *Tibia*.

c, The *Musculus Popliteus*.

d, The fore-part of the Shin-bone.

ee, Parts of the *Gastrocnemius externus*.

f, The inside of the *Gastrocnemius internus*.

g, The *Plantaris* left at its Original: This long slender Tendon here expressed, is placed between the External and Internal *Gastrocnemii*.

h, A large Nerve in its way to the bottom of the Foot.

i, k, The *Flexor Pollicis longus* in situ.

FIG. VI.

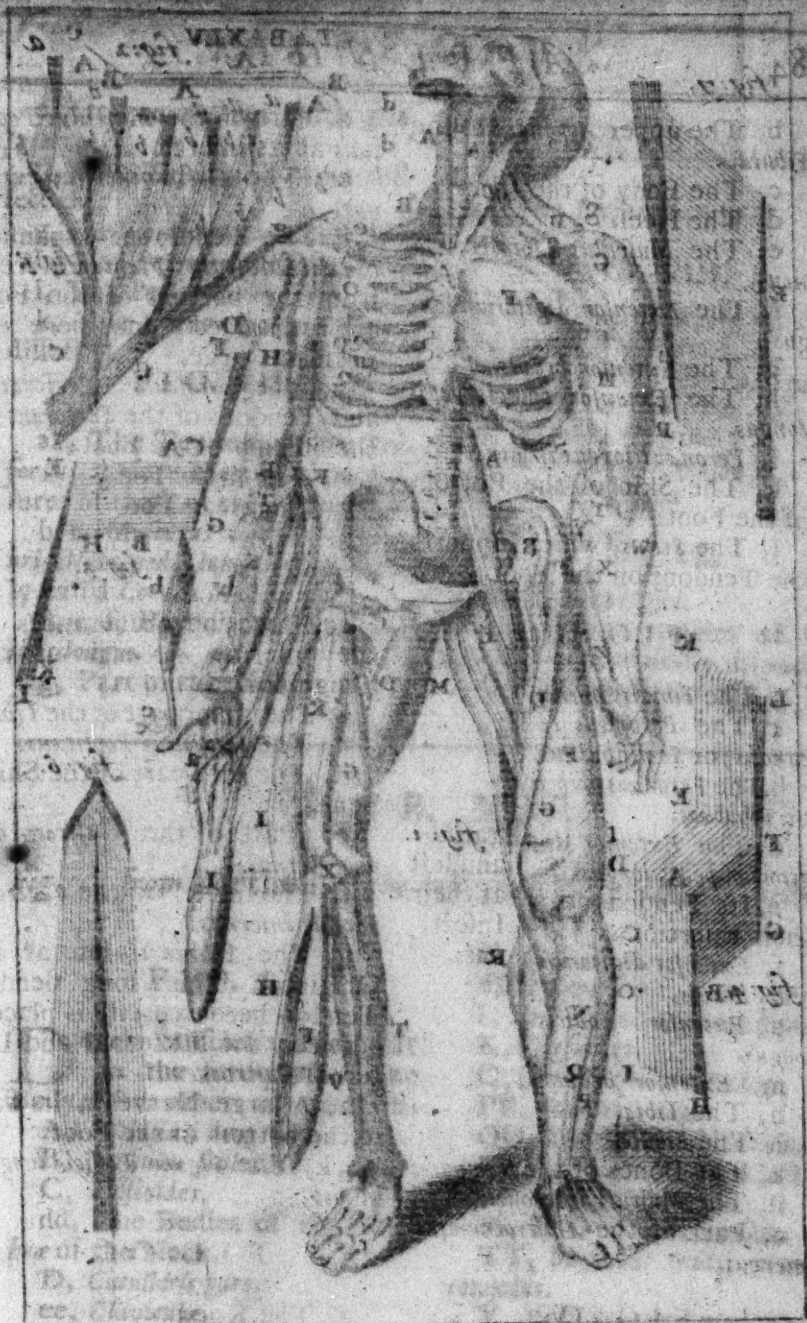
a, The Knee.

b, The Shin-bone or *Tibia*.

c, The *Fibula*.

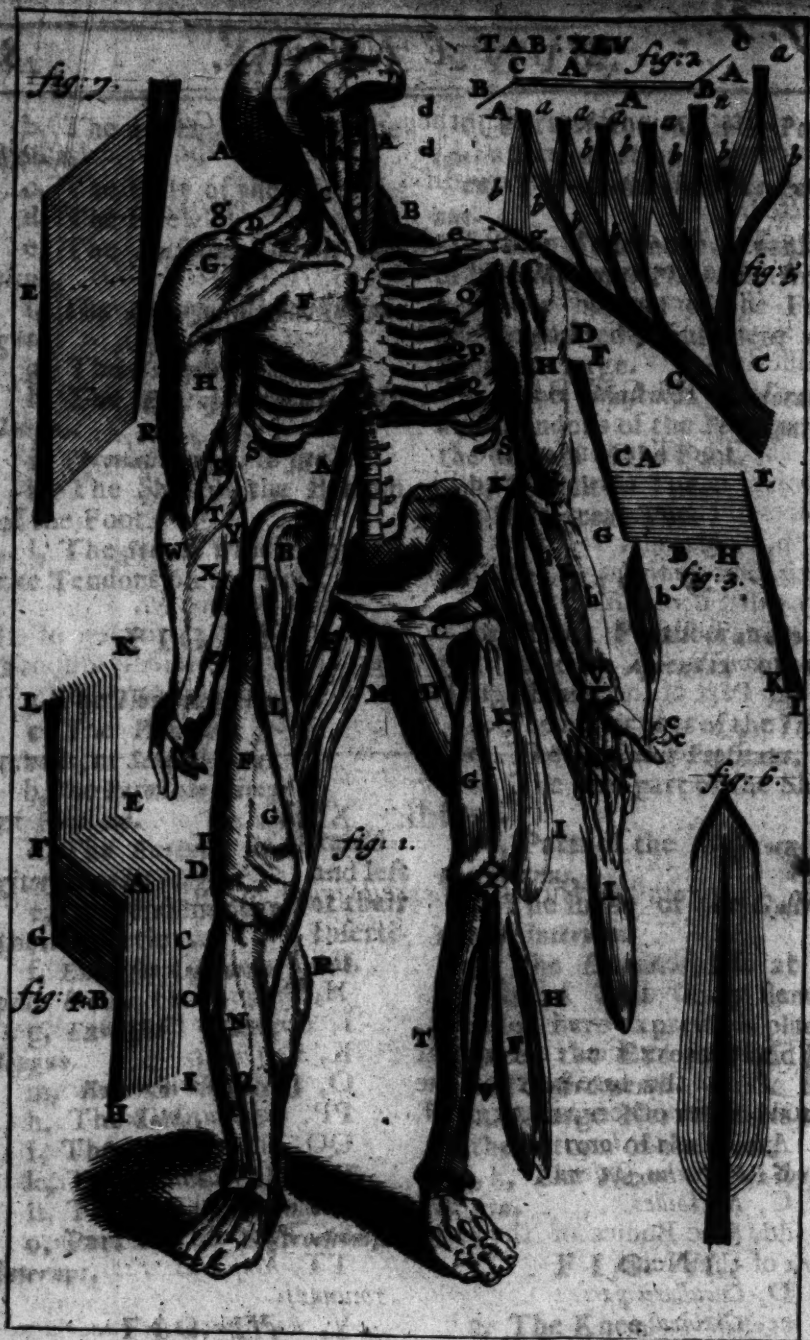
dd, The beginnings of the *Gastrocnemius externus* dissected.

e, Its



D[®]

ch
ions



The upper part of the Tibia.

The Ship-bone or Tibia.

The lower part of the Tibia.

The long ligament of the Tibia.

e, Its conjunction with the *Internus*.

ff, The *Musculus Plantaris* dissected.

g, The *Tibialis posticus* dissected.

h, The *Perforans* dissected.

i, The *Perforatus in situ*.

k, The *Flexor pollicis longus* dissected.

FIG. VII.

aa, The Tendons of the *Perforans*, before they pass the Fissures of those of the *Perforatus*.

b, c, *Musculus communis Lumbricalium pedis longus*, commonly call'd *Cornea Massa*.

d, e, f, Part of the *Flexor pollicis longus*.

g, Part of the *Abductor pollicis*.

h, The *Os Calcis*.

i, Part of the *Musculus Perforans*.

k, The *Perforatus* rais'd.

FIG. VIII.

a, The *Musculi Interossei*.

b, *Abductor minimi digiti*.

cc, Part of the *Abductor pollicis*, and *Flexor pollicis brevis*.

d, *Adductor pollicis*.

e, *Transversalis pedis*.

f, The *Os Calcis*.

FIG. IX.

aa, The *Interossei*.

b, c, Divers Muscles of the great Toe confusedly dispos'd.

d, *Abductor minimi digiti*.

T A B. XLV.

Fig. 1. from Bartholin, the rest from Steno and Bourdon.

FIG. I.

Divers Muscles that appear on the fore-part of the Body, after others are taken off.

AA, *Musculi longi colli*.

B, *Musculus scalenus*.

C, *Mastoides*.

dd, The Bodies of the Vertebrae of the Neck.

D, *Cucullaris pars*.

ee, *Clavicula*.

f, *Sternum*.

g, *Acromion scapulae*.

E, *Musculus subclavius*.

F, *Pectoralis*.

G, *Deltoides*.

H, *Biceps*.

I, *Perforatus* hanging down.

K, *Perforans*.

O, *Serratus minor anticus*.

PP, *Serratus major*.

QQ, *Intercostal Muscles*.

RRR, *Brachiaes*, seen in both Arms under the *Biceps*.

SS, Part of the *Gemellus*.

TT, *Musculus radii pronator rotundus*.

V, *Radii pronator quadratus*.

W, *Supinator radii longus*.

X, *Carpi flexor externus*.

Y, *Musculus palmaris*.

Z, *Flexor carpi internus*.

h, *Ra-*

h, *Radius*.

i, *Cubitus*.

K, The Ligament joining the *Radius* to the *Cubitus*.

aaa, *Musculi lumbricales*.

b, *Flexor pollicis*.

cc, *Abductor pollicis*.

The following Characters are placed on the Parts that are below the Loins.

A, *Musculus Psoas*, or *lumbaris*.

B, *Iliacus internus*.

C, *Obturator internus*.

D, *Triceps*.

E, *Lividus*.

FF, *Musculus rectus* in its proper place, but hanging on the left side from its end.

GG, *Vastus internus*.

H, *Vastus externus*, which being separated, hangs down on the left side.

II, *Membranosus*, or *Fascia lata*.

K, *Crureus*.

L, *Fascialis longus*, or *Sartorius*.

M, *Gracilis*.

N, *Tibialis anticus*.

O, *Peronæus biceps*.

P, The Muscle that extends the four Toes.

Q, *Extensor Pollicis*.

R, *Gastrocnemius*.

rrr, *Musculi interossei*.

S, The Ligament that goes across the Foot, call'd *Anulare*.

T, *Tibia*.

V, *Fibula*.

X, *Patella*.

FIG. II.

The single Fibre of a Muscle.

AA, Its fleshy Part.

BC, BC, Its two tendinous extremes making obtuse Angles with its fleshy Part.

FIG. III.

Many such Fibres as represented in the preceding Figure, which together frame an oblique angled Parallelogram.

A, B, The Orders of the fleshy Fibres.

C, D, F, G, } Their Tendinous
H, I, K, E, } Extremities.

FIG. IV.

The Fibres of a Muscle, framing a simple Parallelopiped Figure.

A, B, C, D, E, F, G, The Carnous Part.

H, I, K, L, The Tendinous Part.

FIG. V.

The Disposition of the Fibres of the *Musculus Deltoides*, said to be compos'd of 12 simple Muscles, as represented by *Steno*.

AA, The upper part of the *Deltoides*, towards the top of the Shoulder.

aa, And the six superior Tendons from which 12 Muscles arise, and are fixt to the *Humerus*.

bbb, The 12 Muscles.

cc, Their two Tendons fixed to the Os *Humeri*.

FIG. VI.

The Order of the Fibres of the *Musculus biceps Humeri*.

FIG. VII.

The Order of the Fibres of the *Musculus Semimembranosus*.

T A B,



...the ... of the ...
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T A B. XLVI.

Fig. 1. From Tho. Bartholin.

2. From Casper Bartholin.

FIG. I.

aa, **P**arts of the Musculi complexi of the Head seen.

BB, Splenii.

CC, Levator scapulae on both sides.

D, Trapezius, or Cucullaris rais'd.

E, Supraspinatus.

F, Infraspinatus.

G, Rotundus major.

H, Rotundus minor.

I, Rhomboides.

K, The broadest Muscle of the Back, call'd Latissimus dorsi.

L, Serratus posticus superior.

M, Serratus posticus inferior.

N, The longest Muscle of the Back, call'd Longissimus dorsi.

O, Sacrolumbus.

P, Quadratus lumborum.

Q, Musculus sacer.

R, S, Gemellus, or Biceps externus.

T, Supinator Radii longus.

V, Extensor carpi Radialis, hanging down.

W, The other Extensor carpi.

X, The two Extensors of the Fingers.

The External Apophysis of the Shoulder, at Z in Bartholin's Figure.

b, Musculus Deltoides.

The following Characters show the Muscles of the lower Limbs.

A, Gluteus major out of its proper place.

B, Gluteus medius in its proper place.

C, The Pyriformal Muscle.

D, Obturator internus, or Mar-supialis.

EE, Biceps bending the Tibia.

g, Musculus semimembranosus.

F, Seminervosus.

h, Gracilis.

i, Triceps in the left side.

K, Vastus externus.

L, Triceps in the right side.

M, Popliteus.

NN, Gastrocnemii, which in the Right Leg are in their proper situation, but hang down in the Left.

OO, Soleus Musculus.

P, Plantaris.

FIG. II.

The Diaphragm revert in this Print.

AA, Musculus superior.

BB, Inferior.

C, The Membranous Tendon of the upper Muscle.

ddd, The Tendons of the lower Muscle.

E, The Perforation for the Vena Cava.

F, The Division in which the descending Trunk of Arteria magna passes.

G, The Perforation in the middle of the lower Muscle for the Oesophagus.

T A B.

T A B. XLVII.

Fig. 1. from Tho. Bartholin, the rest from Ant. Nücke.

FIG. I.

THE Muscles which are placed by, or under those expressed in the first Figure of the preceding Table.

aa, Which should have been placed a little lower, as in the Original, to shew the *Musculi Reſi Minores*.

bb, *Reſi majores*.

cc, *Obliqui superiores*.

dd, *Obliqui inferiores*.

e, *Levator scapulae*.

f, The Scapula bared.

g, *Rotundus major*.

hh, *Transversales colli*.

ii, The two *Spinati*.

k, *Sacrolumbus*.

l, *Longissimus dorsi*.

m, *Sacrolumbus dissected*.

n, *Semispinatus*.

oo, *Musculus sacer*.

p, *Quadratus lumborum*.

q, *Supinator Radii brevis*.

r, *Extensor carpi radialis*.

s, *Extensor carpi ulnaris*.

tt, *Extensor digitorum communis*.

v, *Indicis extensor*.

xx, *Extensores pollicis*.

The following Characters are placed on the lower Limbs.

a, *Gluteus medius* hanging down.

b, *Gluteus minimus in situ*.

c, The same rais'd.

dd, *Pyramiformis* on both sides.

e, *Marsupialis*.

f, The same rais'd on the other side where the Letter

g, Its *Marsupium*.

h, *Obturator externus*.

i, k, *Quadragemini*.

ll, *Biceps*.

m, *Seminembranosus*.

n, *Seminervosus*.

o, *Gracilis*.

p, Part of the *Triceps*.

q, *Vastus externus*.

r, *Tibiaeus posticus*.

s, *Flexor digitorum perforans*, rais'd and left at its two extremes.

t, *Flexor digitorum perforatus*.

v, *Flexor pollicis*.

See the Original for the following References.

z, *Carnea Massa in planta pedis*.

x, *Abductor minimi digiti*.

b, *Pollicis adductor*.

u, *Flexor pollicis brevis*.

s, The long Tendon of the *Flexor pollicis*.

FIG. II.

The Salival Ducts of a Dog.

a, The Salival Duct, discovered by Nücke in Dogs; as it arises from a Gland plac'd in the Orbit of the Eye, and empties it self into the Mouth, g.

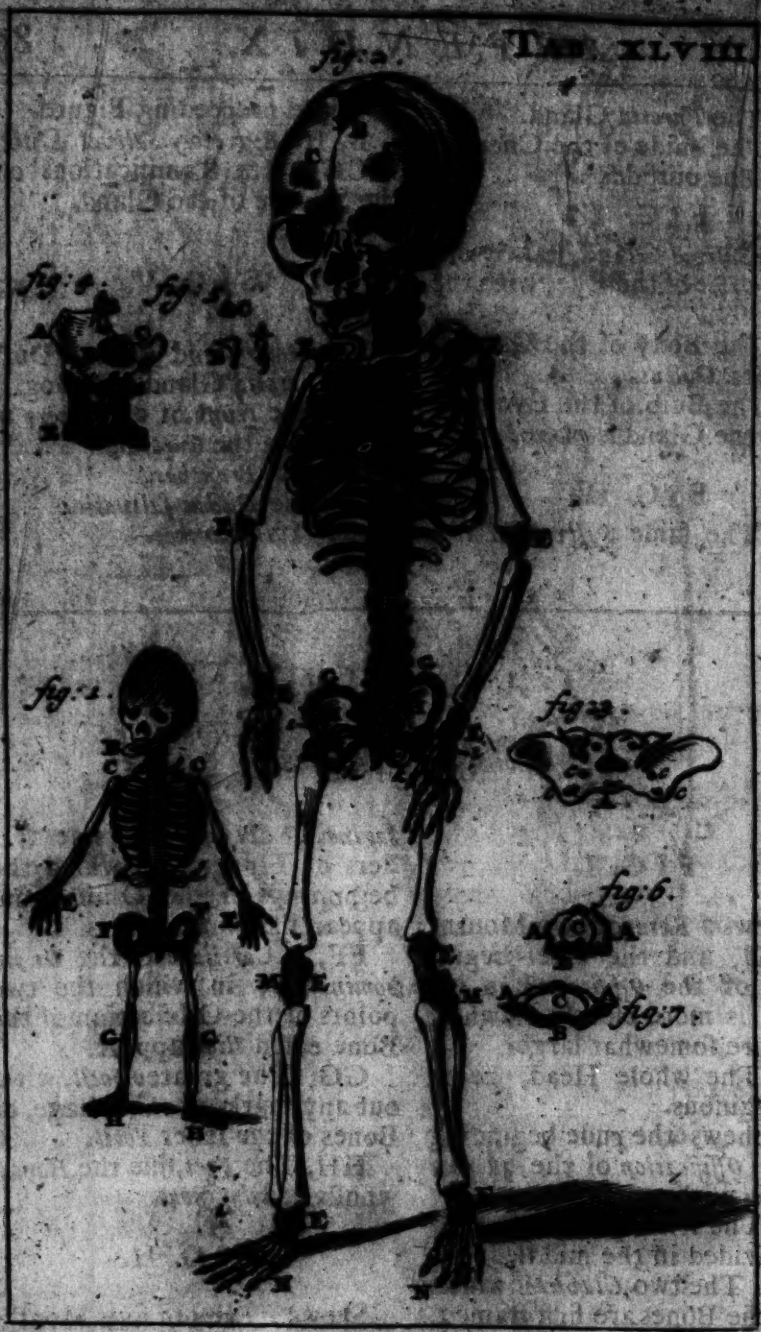
b, The Salival Duct coming from the Parotid Gland, and emptying it self in the Mouth at f.

e, The





A, Claviculae, and Manubria of the Sternum.
 B, The Sternum, and Manubria of the Sternum.
 C, The Sternum, and Manubria of the Sternum.
 D, The Sternum, and Manubria of the Sternum.
 E, The Sternum, and Manubria of the Sternum.
 F, The Sternum, and Manubria of the Sternum.
 G, The Sternum, and Manubria of the Sternum.
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 W, The Sternum, and Manubria of the Sternum.
 X, The Sternum, and Manubria of the Sternum.
 Y, The Sternum, and Manubria of the Sternum.
 Z, The Sternum, and Manubria of the Sternum.



- E, The *Parotid Gland*.
F, The inside of the Cheek.
D, The outside.

FIG. I.I.

The *Salival Gland*, taken out of the *Orbit* of the Eye, with the Eye it self.

- A, The Body of the Gland.
B, Its *Ductus*.
C, The Bulb of the Eye, near which the Gland is placed.

FIG. IV.

- A, The same *Salival Gland*

as in the preceeding Figure.

- B, Its *Excretory Salival Duct*.
CCC, Its Ramifications on the Surface of the Gland.

FIG. V.

The *Artery* and *Salival Duct* of the *Parotid Gland* of a Dog.

- A, The *Trunk* of an *Artery* arising from the *Carotid*.
bbb, Its *Branches*.
C, The *Ductus Salivalis*.
ddd, Its *Branches*.

T A B. XLVIII.

From Keckringius.

FIG. I.

Shews a *Fetus* of two Months old, and the chief beginnings of the *Offification* in it; which is more clearly shown in a Figure somewhat larger.

- A, The whole Head, being cartilaginous.

b, Shews the rude beginning of the *Offification* of the 3d pair of *Bones* of the upper *Jaw*.

- B, The lower *Jaw*, being bony, divided in the middle.

CC, The two *Clavicles*, which of all the *Bones* are first framed.

dddd, The tops and bottoms of the *Ribs*, being cartilaginous, when the others are bony.

- EE, The *Hand*, being carti-

laginous, divided into five Orders of Fingers, in which the beginnings of the *Offifications* appear like small Points.

FF, A *Cartilage* of the *Os innominatum*, in which the two points of the *Offification* of the Bone call'd *Ilion* appear.

GG, The greater *Focil*, without any mark of a *Cartilage*, or *Bones* of the lesser *Focil*.

HH, The *Feet*, like the *Hands*, wholly cartilaginous.

FIG. II.

Shews a *Fetus* of five Months old.

- A, The *Fontanella*.
B, The *Suture* dividing the *Os frontis*.
m CC, The

CC, The cartilaginous center of the *Os frontis*.

D, The division of the lower Jaw.

dd, The Sockets of the Teeth.

EE, Shews the greater Joynts to be cartilaginous, the lesser appear in the Hands and Feet by their blackness.

F, The little Ossifications of the Sternum.

GG, A Cartilage encompassing the *Os Ilion*.

HH, The Bone call'd *Ilion* separated from the two other Bones of the *Os innominatum*.

ii, The *Os Pubis* separated from the other two.

kk, The *Os coxendicis* separated from the *Os Pubis* and *Ilion*.

LL, The great Foramina in the *Ossa Pubis* and *Coxendicis*.

MM, The cartilaginous *Patella*.

NN, Bony Specks appearing in the great Toes, with the rest of the Toes.

FIG. III.

Shews the *Os Spænoïdes*, in a Fœtus of five Months old united.

A, The greater Cartilage about the *sella equina*.

bb, The Holes thro' which the Optic Nerves pass.

cccc, The Holes thro' which the Nerves have their exit.

FIG. IV.

Shews the three little Bones in the *Os Petrosum*.

A, *Os squamosum*.

B, *Processus Zygomaticus*.

C, *Membrana Tympani*.

D, The bony circle about the Tympanum,

eee, The three distinct little Bones of the *Os Petrosum*.

E, The rest of the *Os Petrosum* cartilaginous.

FIG. V.

Shews the Organ of Hearing.

A, The *Malleus*, with its long cartilaginous Process a, to which the Membrane of the Tympanum joyns.

B, The *Incus*, with its Process b, likewise cartilaginous.

C, The *Stapes*, not yet in the form of an *Isosecles*.

FIG. VI.

The *Epistropheus*, or second vertebra of the Neck.

AA, The two lateral bony Processes of the second vertebra of the Neck.

B, Its Body, now appearing bony.

C, The Foramen for the passage of the Spinal Marrow.

FIG. VII.

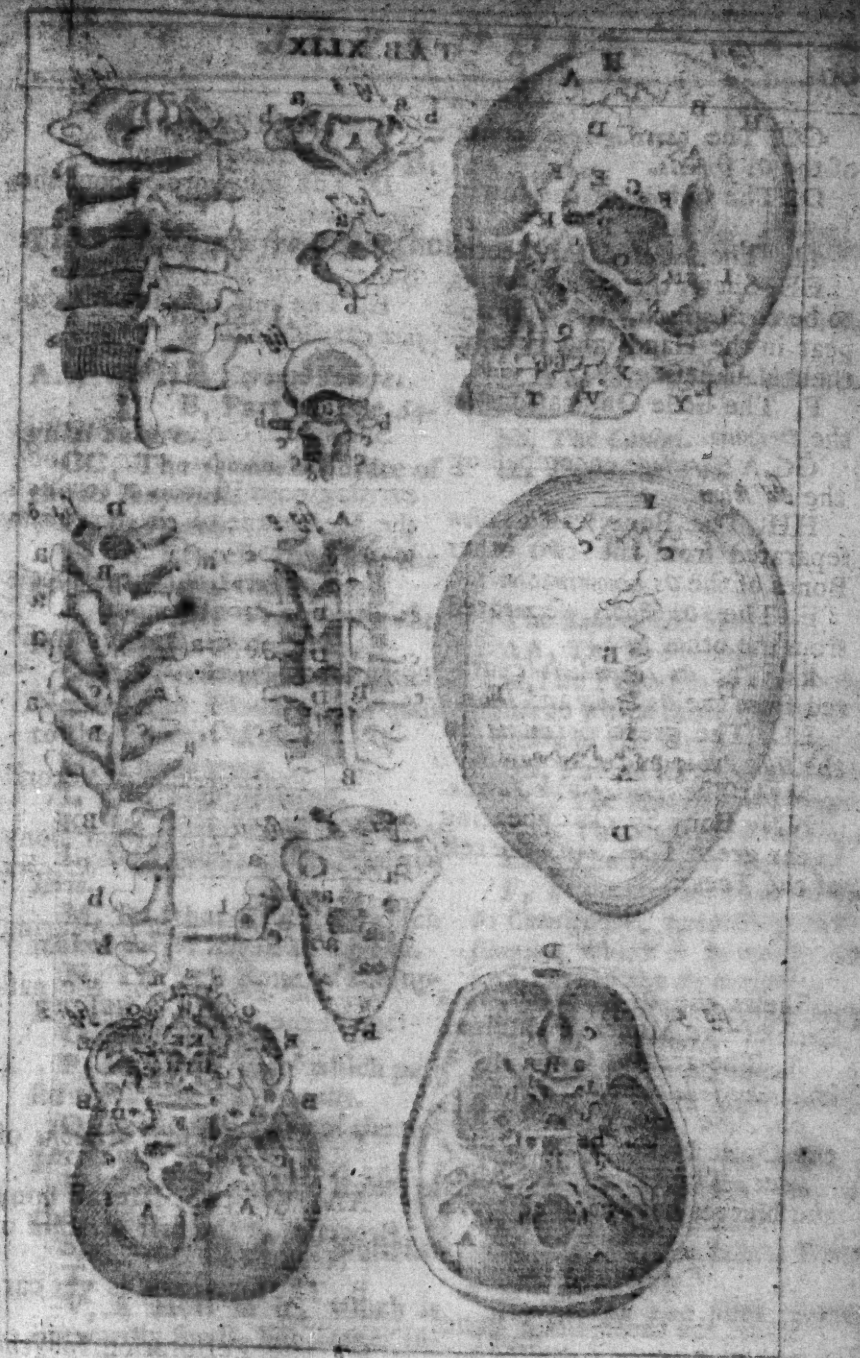
The *Atlas* or first vertebra of the Neck.

AA, The two lateral bony Processes of the first vertebra of the Neck.

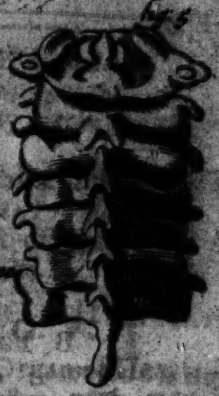
B, The fore-part, as yet cartilaginous.

C, The Perforation for the passage of the Spinal Marrow.

T A B.



TAB. XIII.



T A B. XLIX.

The 1st and 4th from Bartholin, the rest from Veslingius.

FIG. I.

AA, THE Coronal Suture.

B, Part of the Sagittal Suture.

CC, The squamous Suture of the *Os Temporum*.

D, *Os Frontis*.

E, Its Process towards the great *Canthus* of the Eye.

F, Its other Process to the lesser *Canthus* of the Eye.

G, Its Perforation, by which Nerves and Blood-vessels pass to the Frontal Muscle.

H, The *Bregma*.

I, The Temple-bone.

K, Its Appendix call'd *Styloides*.

L, Its Process call'd *Mammillaris*.

M, Its other Process, which makes the *Os Zygale* or *Zygoma*.

N, The first Bone of the upper Jaw.

O, The Second.

P, Its Hole, thro' which passes the *Ductus Lacrymalis*.

Q, The fourth Bone of the upper Jaw.

R, The first proper Bones of the Nose.

S, The *septum* of the Nostrils.

T, The lower Jaw.

V, A Hole in it, which is outwardly small, but larger internally.

X, The *Processus* of the lower Jaw, call'd *Corone*.

Y, Its other blunt Process, call'd *Condylodes*.

Z, The fore-Teeth, call'd *Incisores*.

bb, The *Canini*.

cc, *Dentes molares*.

FIG. II.

The Basis of the Skull.

AA, The *Os Occipitis*.

aa, The Processes of the *Os Occipitis* to which those of the first *vertebra* of the Neck are joyn'd.

BB, Part of the Temple-bone.

CC, The *Mammiform* Process.

DD, The *Styliform* Process.

EE, The *Processus Fugalis*.

F, The external Face of the *Os Cuneiforme*, according to *Veslingius*; which is properly the fore-part of the *Os Occipitis*.

GH, GH, The *Processus Pterygoides*, or *Aliformes*.

I, The *Septum Narium*.

KK, The sixth Bone of the upper Jaw.

kk, Two Holes by which a Branch of the fifth pair of Nerves go to the Palate.

LL, Parts of the fourth Bones of the upper Jaw.

m, Shews the four cutting Teeth.

nn, The two *Dog* Teeth.

oo, The rest of the Teeth, call'd the *Grinders*.

m 2

FIG.

FIG. III.

The Letters are so confusely placed in this Copy, that we must refer you to the Original Figure of *Vestlingius*.

AA, The hollow of the *Os Occipitis* within the Skull, in which the *Cerebellum* is receiv'd.

B, The internal Face of the *Os Sphenoides*.

CC, *Os Ethmoides*.

D, The Cavity of the Bone of the Forehead above the Nose

aa, The first hole of the *Os Sphenoides* or *Cuneiformis*.

aa, The second hole in the same Bone.

bb, The third.

cc, The sixth.

†, The seventh.

dd, The fifth Perforation of *Os Cuneiforme*.

ee, The first Perforation of the Temple-bone.

ff, The stony Process of the Temple-bone.

gg, The third Perforation of the Temple-bone.

hh, The fourth and fifth Perforation of the *Os Occipitis*.

FIG. IV.

The top of the Skull,

A, The Coronal Suture.

B, The Sagittal.

CC, The Lambdoidal Suture.

D, The *Os Frontis*, or Forehead-bone.

EE, The *Offa Sincipitis*, or *Bregmatis*,

F, Part of the *Os Occipitis*,

FIG. V.

Shews the Back parts of all the *Vertebrae* of the Neck together.

FIG. VI.

A, The first *Vertebra* of the Neck, call'd *Atlas*.

aa, Shews the two *Sinūs* that receive the *Occiput*.

bb, The transverse Processes; in which are *Foramina*, thro' which Blood-Vessels pass to the Head.

FIG. VII.

The second *Vertebra* of the Neck.

a, Its Process call'd *Dens*.

b, Its double *Spine*.

FIG. VIII.

Some *Vertebrae* of the Back view'd behind.

aa, Their transverse Processes

BB, Their Spinal Processes.

CC, The Bodies of the *Vertebrae*.

FIG. IX.

A, The back parts of the upper, and B the lower *Vertebra* of the Loins.

CCC, Their transverse Processes.

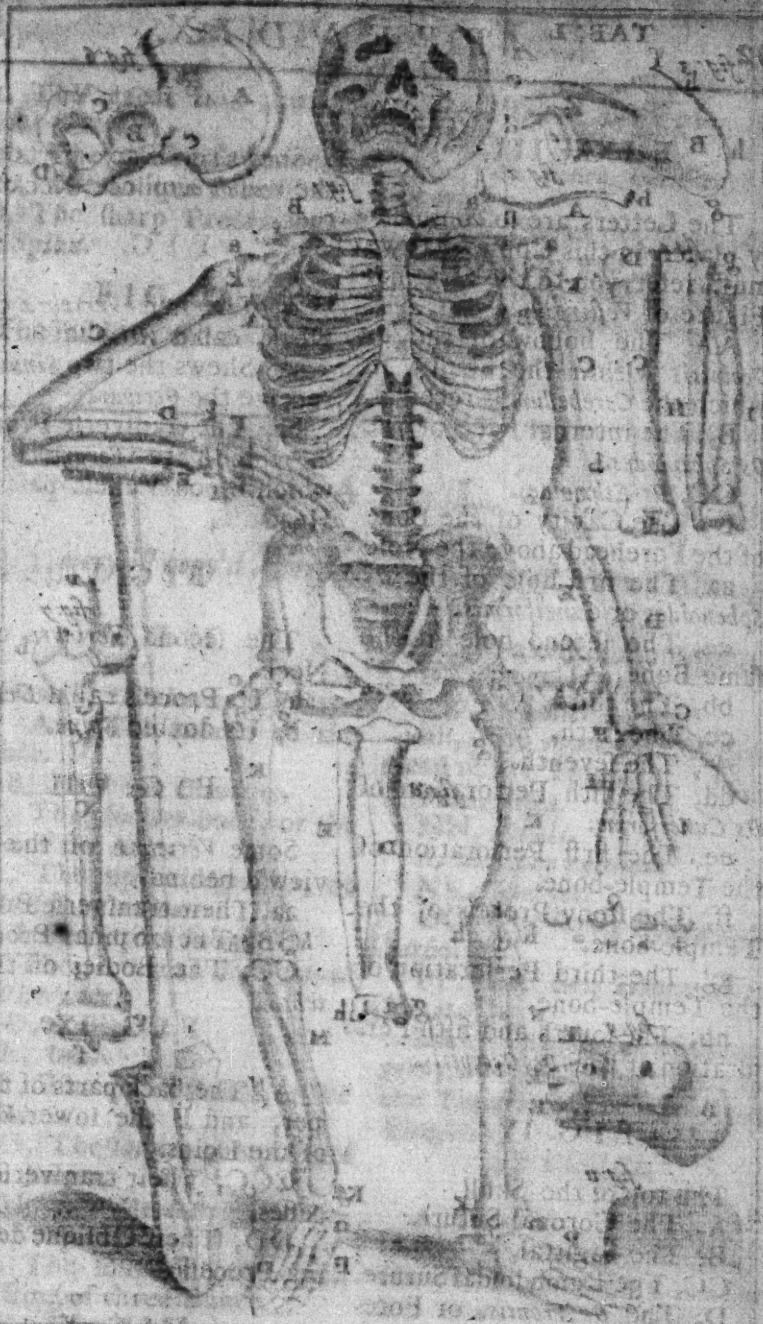
DD, Their Oblique descending Processes.

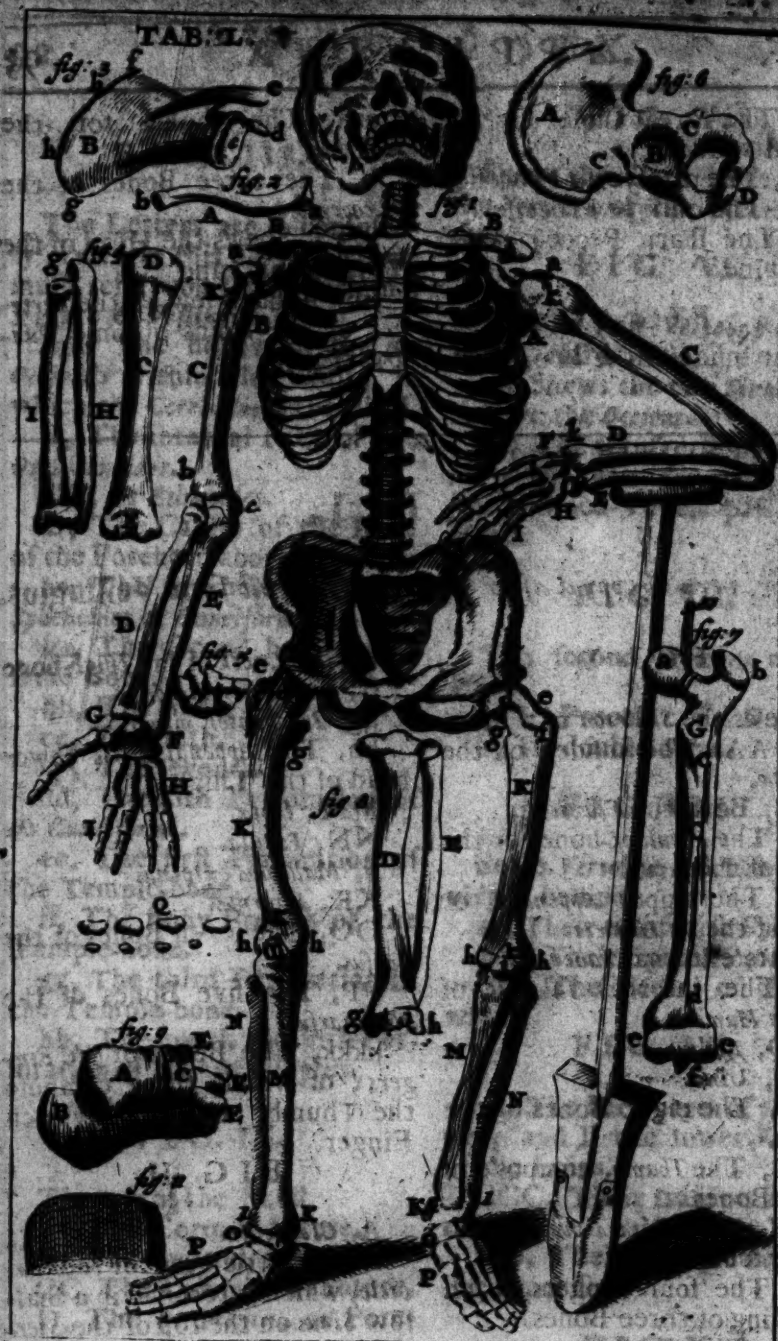
FIG. X.

One of the *Vertebrae* of the Loins view'd from behind.

a, The

TABLE
The bones of the human body
The bones of the human body are divided into three parts: the skull, the trunk, and the limbs. The skull is composed of the cranium and the face. The trunk is composed of the vertebrae, the ribs, and the sternum. The limbs are composed of the humerus, the radius, the ulna, the carpals, the metacarpals, the phalanges, the tibia, the fibula, the tarsals, and the metatarsals. The bones of the human body are made of a hard substance called osseous matter, which is composed of a mineral and an organic part. The mineral part is called phosphate of lime, and the organic part is called ossein. The bones are covered by a membrane called the periosteum, which is composed of an outer layer of fibrous tissue and an inner layer of osseous tissue. The bones are joined together by ligaments, which are composed of a fibrous substance. The bones of the human body are essential for the support and movement of the body.





a, The great hole for the Spinal Marrow.
bb, The transverse Processes.
cc, The oblique Processes.
d, The sharp Process called the Spine.

aaa, The holes for the Nerves.

b, The three Bones of the *Os coccygis*.

a, e, i, Shews the Head of the Thigh-bone, and

bb, A side view of the *Vertebra* of the Loins of some *Quadrupede*.

FIG. XI.

The inside of the *Os Sacrum*.

T A B. L.

Fig. 1. *very ill copy'd after Vesalius, the rest from Veslingius.*

FIG. I.

Shews the Skeleton of a Man.
AA, The insides of the *Scapulae*.

BB, Both the *Clavicles*.

C, The Shoulder-bone, or the Bone of the Arm.

aa, The upper Appendix, or head of the *Os Humeri*.

b, Its external Tubercle.

c, The internal Tubercle of the *Os Humeri*.

DD, *Radius*.

EE, *Ulna*.

FF, The eight Bones of the *Carpus*.

GG, The Thumb, compos'd of three Bones.

HH, The *Metacarpus*, produced of four Bones.

II, The four Fingers, each consisting of three Bones.

KK, The Thigh-bones.

LL, *Patella*, or the Knee-pan.

dd, The head of the Thigh-bone, or *Appendix superior*.

ee, The neck of the Thigh-bone.

ff, *Trochanter major*.

gg, *Trochanter minor*.

hh, The Appendix, or lower head of the Thigh.

MM, *Tibia*.

NN, *Fibula*.

ii, *Malleolus externus*.

KK, *Internus*.

OO, The seven Bones of the *Tarsus*.

PP, The five Bones of the *Metatarsus*.

kkkk, The Bones of the Fingers; of which three compose the Thumb, and as many each Finger.

FIG. II.

A, *Clavicula*.

a, The little head of the *Clavicle*, which is receiv'd in a shallow *Sinus* on the top of the *Sternum*.

b, The end of the *Clavicle*, by which it is join'd to the Spinal Process of the *Scapula*.

FIG.

FIG. III.

B, *Scapula*, or Shoulder-blade.
c, The *short Process* of the *Scapula* receiving the Shoulder-bone.

d, The *Process* of the *Scapula*, call'd *Coracoides*, partly seen.

e, The *Spinal Process* of the *Scapula*.

f, The *upper Angle*.

g, The *lower Angle*.

hh, The *Basís* of the *Scapula*.

FIG. IV.

C, The *back part* of the *Os Humeri*.

D, The *upper head* of the same.

E, Its *lower head*.

G, The *Process* of the *Ulna*, commonly call'd the *Elbow*.

H, The *Ulna*.

L, The *Radius*.

FIG. V.

The *eight Bones* of the *Carpus*.

FIG. VI.

A, The *inside* of the *Os Ilium*.

B, Its *Acetabulum*, which receives the head of the *Thigh-bone*.

C, *Os Ischii*.

D, *Os Pubis*.

FIG. VII.

C, d, The *back-part* of the *Thigh-bone*.

a, Its *head*, or *upper Appendix*.

b, *Trochanter major*.

c, *Linea aspera*.

G, *Trochanter minor*.

ee, The *heads* of the *lower Appendix*.

f, Part of the *Patella*.

FIG. VIII.

D, The *Tibia* view'd behind.

G, *Malleolus internus*.

E, *Fibula*.

g, *Malleolus internus*.

h, *Malleolus externus*.

ii, The *Appendix* of the *Tibia*.

FIG. IX.

A, *Astragalus*.

B, The *Os Calcis*.

c, *Os Cymbiforme*.

D, *Os Cubiforme*.

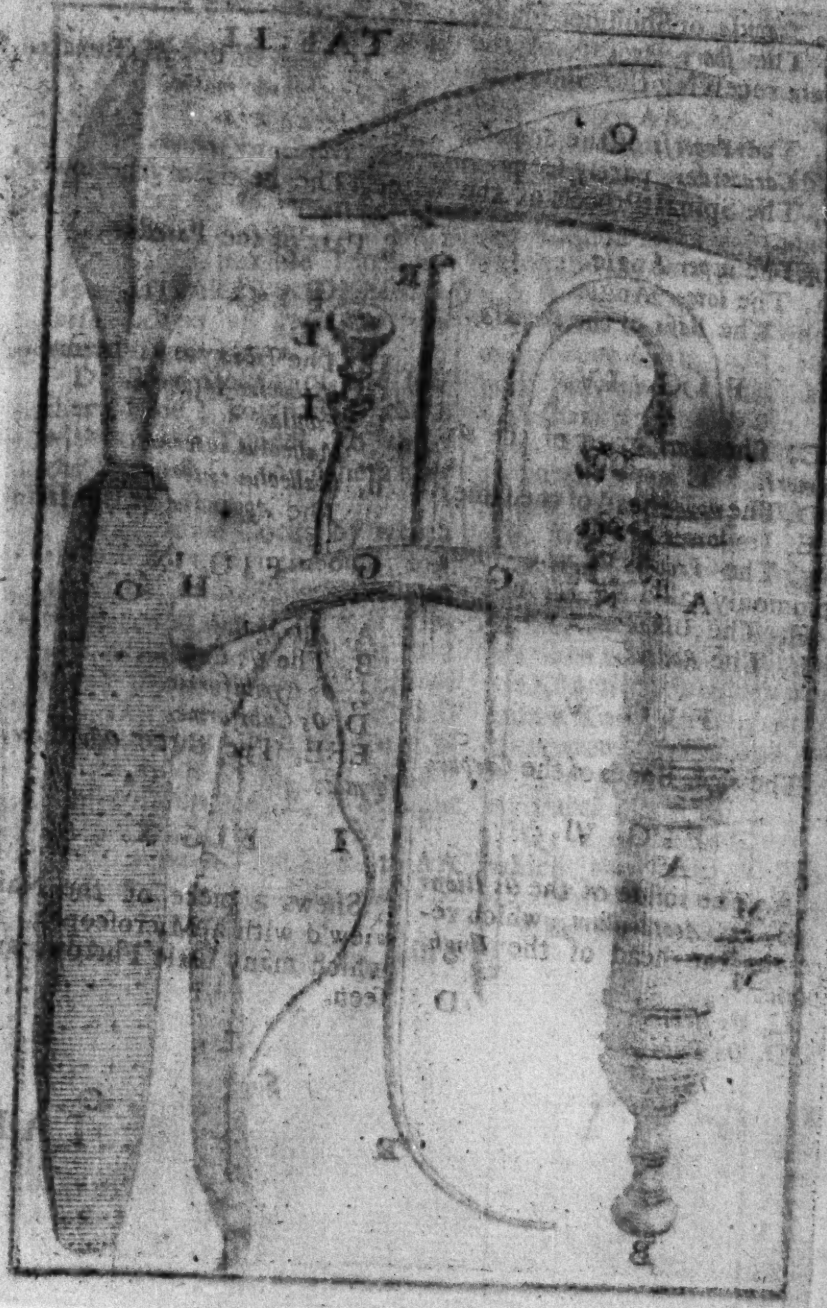
EEE, The *three Ossa Cuneiformia*.

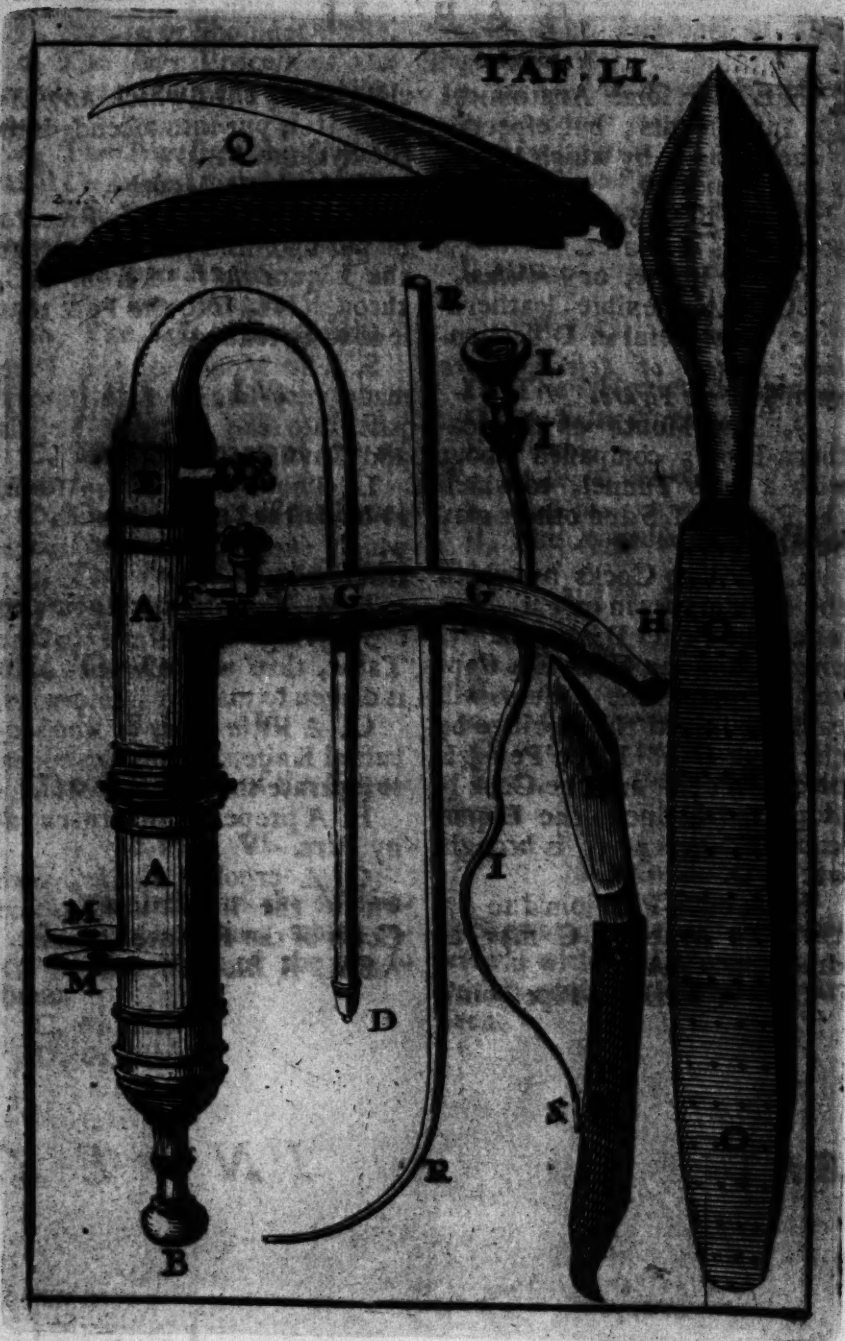
FIG. X.

Shews a piece of the *Nail*, view'd with a *Microscope*; in which many little *Furrows* are seen.

TAB.

FIG. 15





T A B. LI.

SHEWS some Anatomical Instruments; but especially the *Syringe*, by which Water is easily injected.

AA, A Brass *Syringe*, holding 20 Ounces of Water.

B, The Pestle, or *Embolum*.

CCC, A flexible leathern-Pipe, very useful in Dissection. *These Letters of Reference are wanting in the Figure.*

D, The Mouth of the leathern-Pipe; compassed about with a brass Tunnel, to which the Pipe **I.I.I.S** and others may be fitted.

E, N, Two Cocks by which the Liquor goes in or out. For when the Pestle **B** is in the *Syringe*, and the Cock **E** is stopt and **N** open, the Liquor will easily pass into the *Syringe* by the Pipe **GG**: If the Pestle **B** be drawn out, and the Cock **N** stopt and **E** open, the Liquor contain'd in **AA**, **E**, is brought out at **D**.

F, A brass-Pipe join'd to **AA** that the Water **GG** may be drawn into **AA**.

GG, A leathern-Pipe join'd

close to **F**; thro' which any Liquor it is put into ascends into the *Syringe* **AA**.

H, Its brass Mouth.

III, A silver or brass-Pipe, to be put upon the Mouth **D**, that the Liquor may go from **CC**, through **III**, into the Part that it is to be sent to.

S, The Mouth of the Pipe made very small, that it may pass into the Lateral Vessels and Chyliferous Ducts.

L, The Mouth of the Pipe, to be fastned to the Mouth **D**; which skews, but with much trouble.

MM, Two Loops by which the *Syringe* is fastned to the Table, thro' whose holes a Nail is driven to make it immovable.

O, A little ivory or wooden-hafted Knife, having two edges, to separate the Skin and Muscles

P, A proper Knife to cut any Part.

Q, A crooked Knife, with which the little Vessels and Coats of the Eye are dissected.

RR, A Blow-Pipe.

I N D E X.



